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The Poisonous Terrestrial Snakes of our British Indian Dominions

and

How to Recognise them.

BY.

MAJOR F. WALL, I.M.S., C.M.Z.S.

Second Edition, Third Thousand.

BOMBAY:
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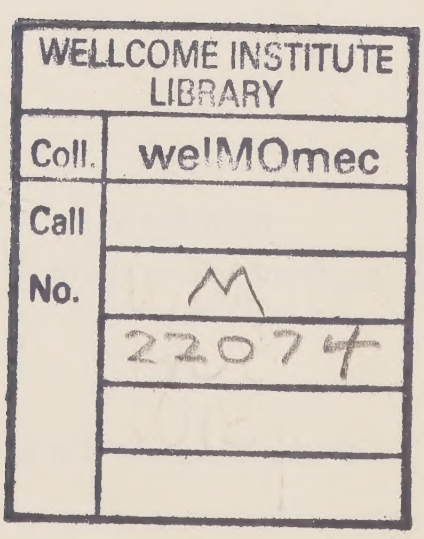

POISONOUS SNAKES.

Press Comments on the First Edition.

"This book . . . . meets a long-felt want, in affording a ready means of identifying a dead snake." . . . .

"Invaluable to medical men in India." . . . . . .

"So far as the venomous kinds are concerned a very little practice with Major Wall's key will enable any one to discover the species with ease and certainty."—*Country Queries and Notes*, May 1908.

"The book is arranged in the most lucid manner, and ought to be included in the library of every Anglo-Indian. It reveals a large amount of patient research work, and is interesting throughout."

—*The Pioneer*, 9th February 1908.

"Of great value to the medical profession as well as to the naturalist."—Review, *Times of India.*

"The book is well adapted to enable medical men and others to identify with the minimum of trouble any of the Indian poisonous land snakes."—*Madras Mail.*

"A valuable contribution to the literature of the Thanatophidia of India."—*Advocate of India.*

"The object of Major Wall's little book is to point out characters of scaling by which, in his opinion, any one should be able to arrive at the name of any poisonous snake . . . . . To many, the system proposed in this book will be of real utility . . . . . We wish Major Wall's little work a wide circulation in India."

—G. A. B. *Country Life*, April 1908.

PREFACE.

The first edition (of 2,500 copies) of this little work having run out, I have been asked to revise and bring it up to date. Though so short a time has elapsed since its first publication, there are many important additions to be made, notably the viper *Pseudocerastes persicus* recorded within our Indian limits by Dr. Annandale in 1904 and omitted from the first edition by an oversight. In the first edition I adopted *in toto* Professor Boulenger's arrangement of species though I have for years tacitly dissented from some of his opinions. Specimens which have reached me in the recent past enable me to put forward, without hesitation, my own views, and this I venture to do in the present edition.

Under the title *Ancistrodon hypnale* two species have I think been confused, the type a Ceylon form, and a second known to me only from the Bombay Ghâts (Castle Rock), and Carwar. To this new species I have given Mr. W. S. Millard's name in recognition of the extremely valuable work he has for years carried on in the interests of the Bombay Natural History Society.

My recent collections of Assam snakes have revealed the occurrence in that area of two distinct species of black krait, the smaller *Bungarus lividus* and a larger form for which I propose the name *Bungarus niger*.

Further, I have long believed that under the title *Bungarus candidus*, Professor Boulenger has included at least four distinct species, to three of which he accords

the minor rank of variety, *viz.*, *forma typica* i. e., *candidus*, variety *multicinctus*, and variety *cæruleus*. A fourth equally distinct form, *viz.*, *magnimaculatus* has received no recognition. Now all these forms are very distinctive in colour and markings, are not connected by intermediate forms, inhabit very definite geographical areas and show differences in lepidosis, so that I feel there is every justification for each being recognised as a distinct species. Three of these occur within our limits, but *B. candidus* is a Malayan form only.

Thus, with five additions, the total number of poisonous snakes now known within our Indian limits amounts to thirty-nine species.

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AN APPEAL.

The author will be very pleased to identify, and return any snakes sent to him, and would be most grateful for any information however meagre his readers may be able to give him of snake bite fatalities, especially where the offender has been killed. No matter how mutilated this may be it is of value. He feels certain that much valuable information concerning snakes, the poison of which we are entirely ignorant, is being lost to science each year. Specimens should be addressed to the Honorary Secretary, *Bombay Natural History Society*, 6, Apollo Street, Bombay.

THE POISONOUS TERRESTRIAL SNAKES OF OUR BRITISH INDIAN DOMINIONS AND HOW TO RECOGNISE THEM.

(Reprinted from papers which appeared in the Bombay Natural History Journal by special request of the Inspector-General of Civil Hospitals, Central Provinces, and others.)

By Major F. Wall, I.M.S., C.M.Z.S.

Introductory Remarks.

During the last decade a vast advancement in our knowledge of snake venoms has been acquired, both in the province of toxicology and in the all-important one of therapeutics.

Whilst many observers have been engaged in the intricate, laborious, and minute researches connected with the investigation of the toxic properties of various venoms, very little, if any, advance has been achieved in that equally important and sister branch of the subject which deals with the identification of snakes, and especially with the distinction of the poisonous from the non-poisonous varieties.

In the treatment of snake-bite these two fields, though very distinct, are mutually interdependent. It is of little use to have the knowledge derived from one set of investigators at one's finger's ends, and its fruits—*viz.*, antivenene—to hand in all our hospitals, if the medical attendant is incompetent to recognise a poisonous snake. It is only this

knowledge in conjunction with the other that can make rational treatment possible, by teaching him when to withhold antivenene, and when to administer it.

It is to meet the unsatisfactory state of our knowledge on the subject of the identification of snakes that these papers have been contemplated, in the hope that they may bring this part of the subject up to a standard approaching that to which we have arrived in the study of snake venoms. Fully appreciating the already over voluminous and ever-increasing subjects which the profession of medicine embraces I have endeavoured to make the subject as practical as possible to the oriental practitioner by avoiding technicalities, or, where this cannot be done, explaining them with the aid of outline drawings, by which means I hope to bring the matter of identification within the easy grasp of hospital assistants and assistant surgeons, as well as medical officers.

In Volume XIV of the Bombay Natural History Society's Journal I wrote a paper on the distinguishing characters between poisonous and non-poisonous snakes, and appended a key in which I attempted to frame easy rules for their separation. This key far from satisfied me at the time, its length and complexity detracting from its practical value; however, in spite of its shortcomings, it has been favorably received, and I have been repeatedly asked for spare copies till my stock is exhausted. Recently the Inspector-General of Civil Hospitals in the Central Provinces wrote asking if he might circulate this paper in his Province, and the compliment conveyed in this request has caused me to revise it. Since its publication, in 1901, I have examined many hundreds of snakes collected by myself and others as well as large collections in various institutions, including the British Museum, and I am, therefore, now better qualified to deal with this subject. As a result I find that I can simplify and curtail the original key so as to considerably enhance its practical utility.

The good reception accorded to this first brief paper has prompted me to extend my remarks, so that in the present paper I propose to deal in detail with every known poisonous land snake within our Indian Possessions. The easy identification of these is my first object, and one which I hope to assist by means of outline drawings, but I hope to do more, and to incorporate with each species a few remarks so as to

make the paper useful to the medical profession as well as to the naturalist.

The abbreviations marked on the shields in the outline figures attached to these papers are the same throughout, and read as follows:—

An.	Anal.	Prf.	Præfrontal.
A.S.	Anterior sublinguals.	P.S.	Posterior sublinguals.
C.	Costals.	R.	Rostral.
F.	Frontal.	S.	Supraocular.
Int.	Internasal.	Sc.	Subcaudal.
L.	Loreal.	Sl.	Supraloreal.
M.	Mental.	So.	Subocular.
N.	Nasal.	Sub.	Sublingual.
Oc.	Occipital.	T.	Temporal.
Pa.	Parietal.	V.	Ventrals.
Po.	Postocular.	Val.	Vertebrals.
Pra.	Præocular.	Arabic numerals—Supralabials.	

Roman numerals—Infralabials.

With reference to *midbody* the point indicated is midway between the snout and the anus or vent (a transverse slit in the hinder part of the belly, see fig 9). *Anterior* with reference to scales indicates a point 2 head lengths behind the head; *posterior* similarly implies a point 2 head lengths in front of the vent.

The conception of a poisonous snake, as alluded to hereafter, demands some remarks on the classification of these reptiles.

Mr. Boulenger considers the *Ophidia* (snakes) a Suborder of the Order *Squamata* (which includes lizards and chameleons). He divides snakes into nine families based on osteological peculiarities which can only be made apparent by the minutest and most careful dissection or disintegration of the soft tissues, and hence are of far too complicated a character for the general enquirer to readily investigate or comprehend. I venture to think the same end may be equally well attained by attention to external characters alone. The recommendation for such a method is obvious, since it enables the enquirer to ascertain at a glance the requisite points by an examination of the creature as it lies

dead before him. Without disturbing Mr. Boulenger's classification, which is the accepted one, I divide them as follows:—

TAILS NOT MARKEDLY COMPRESSED

(*i.e.*, not flattened like an eel's—*see* fig. 1 B and C).

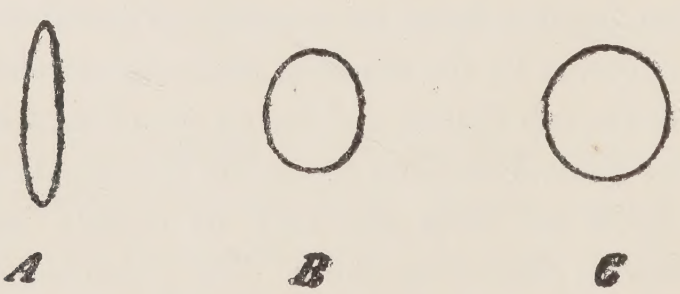
	FAMILY.	
A—VENTRALS ABSENT. *Snakes in which the belly and back are clothed with identical scales* (*see fig.* 2).	1 Typhlopidæ. 2 Glauconiidæ.	Small blind snakes worm-like, and living beneath the ground. HARMLESS.
B—VENTRALS NARROW. *Snakes with the belly covered with transverse plates* (*ventrals*) *which however do not extend completely across the belly, so that when the specimen is laid on its back the whole of the last costal row, or even many costal rows, are visible on each side* (*see figs.* 3 *and* 4).	3 Boidæ. 4 Ilysiidæ. 5 Uropeltidæ. 6 Xenopeltidæ. 7 Colubridæ. (*Sub-family* Homalopsinæ).	HARMLESS.
C—VENTRALS BROAD. *Snakes with the belly shields stretching so far across as to permit only* part *of the last costal row to be seen on each side when the specimen is laid on its back* (*see fig.* 5).	7 Colubridæ (except the *Sub-families* Homalopsinæ and Hydrophiinæ). 8 Amblycephalidæ. 9 Viperidæ.	INCLUDES HARMLESS AND POISONOUS VARIETIES. HARMLESS. POISONOUS.

TAILS COMPRESSED

(*i.e.*, flattened like an eel's—*see* fig. 1 A).

Sea snakes. *Family* Colubridæ. *Sub-family* Hydrophiinæ. POISONOUS.

FIG. 1.



A—Highly compressed tail typical of the sea snakes (Hydrophiinæ). Poisonous.
B and C—Slightly compressed and round tails of landsnakes (including fresh water forms) seen in both harmless and poisonous species.

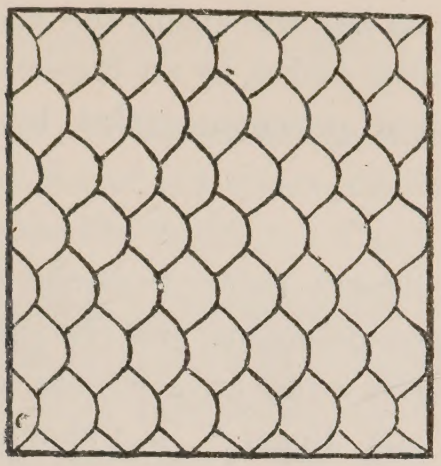


FIG. 2.—Belly of Typhlops (× 5)

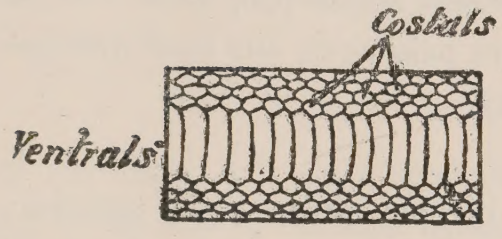


FIG. 3.—Belly of Hipistes hydrinus (nat. size).

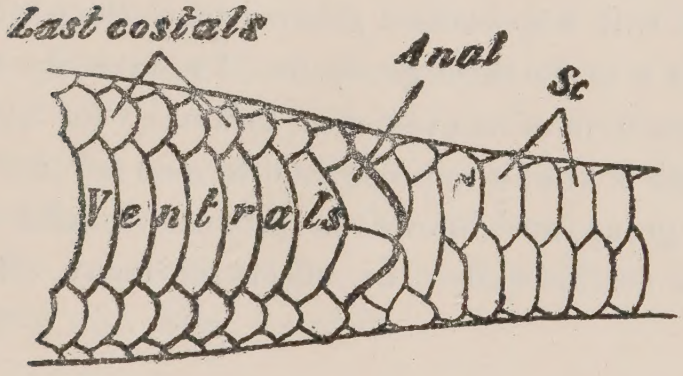


FIG. 4.—Xenopeltis unicolor.

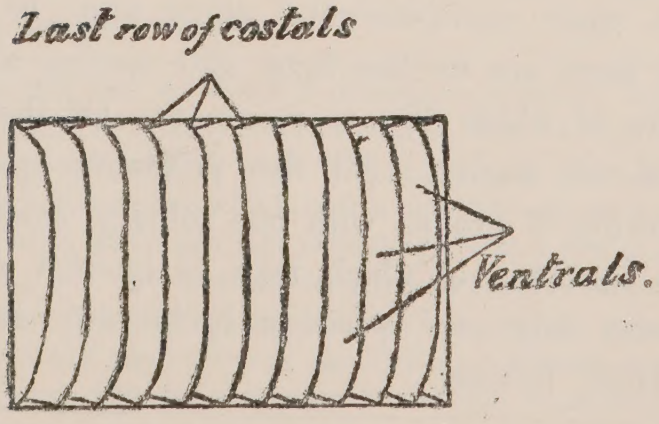


FIG. 5.—Belly of Russell's viper.

A glance at this simple key will enable the enquirer to isolate two large groups of harmless snakes, by an inspection of the belly shields alone, and a third group of poisonous snakes by the conformation of the tail (sea snakes).

It is a somewhat difficult matter to decide where to draw the line between the so-called non-poisonous and the poisonous varieties. To begin with, all the *viperine* snakes are poisonous, and from investigations conducted by Alcock and Rogers* in Calcutta in 1902 it appears probable that all *colubrine* snakes contain in their saliva a toxic element identical with that to which the poisons of the cobras, kraits, and other deadly colubrines owe their lethal properties. If this is so, strictly speaking, *all* colubrines are poisonous, and their various salivas merely differ in degrees of toxicity.

The *Colubridæ* are divided into three groups: (1) *Aglypha* characterised by the absence of a poison fang, (2) *Opisthoglypha*, snakes furnished with a specialised tooth in the form of a grooved fang situated at the back of the maxilla (upper jaw bone), and (3) *Proteroglypha*, snakes endowed with a specialised grooved tooth (fang) in the front of the maxilla. It is to the third group that I reserve the term "poisonous," purely as a term of convenience however, for although all the snakes whose bite is known to prove fatal to man fall into this category many of the group are known to produce baneful effects usually falling short of death, whilst the effects of many others remain in obscurity.

The difficulty in laying down hard and fast rules by which to distinguish the poisonous varieties and separate them one and all from their non-poisonous allies may be appreciated from the fact that there are no less than 320 species already known within our limits, of which 68 are poisonous. Of these 68 species, 39 are terrestrial, 29 marine. All the poisonous species fall into one of the following 5 groups with one solitary exception, *viz.*, *Azemiops feæ*, the existence of which may be ignored for all practical purposes since only one specimen is known. It was found in the Kachin Hills, Burma.

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* Proceedings of the Royal Society, 1902, p. 446

Key to distinguish the Poisonous Snakes.

1.	Tail compressed (*i.e.*, flattened like an eel's) (*see* Fig. 1A). Snout and crown covered with large plate-like shields (*see* Fig. 6).	Sea snakes (29 species). (*see* p. 8.)	Poisonous colubers.
2.	Tail round (*see* Fig. 1 C). Median row of scales down the back distinctly enlarged (*see* Fig. 7). Only 4 infralabial shields, the 4th largest (*see* I to IV, Fig. 8).	Kraits (11 species). (*see* p. 9.)	
3.	Tail round (*see* Fig. 1 C). 3rd supralabial touching the nasal shield and the eye (*see* Fig. 12).*	Cobras and coral snakes (9 species). (*see p.* 25).	
4.	Tail round (*see* Fig. 1 C). A conspicuous opening in the side of the face between the eye and the nostril (*see* Fig. 24B). Vertebrals not enlarged. †	Pit vipers (13 species). (*see* p. 41.)	Vipers (all poisonous).
5.	Tail round (*see* Fig. 1 C). Snout and crown covered with small scales as on back of body (*see* Fig. 37). Only part of the last row of costals visible on either side of the ventrals when the specimen is laid on its back (*see* Fig. 5 and contrast with Figs. 3 and 4).	Pitless vipers (5 species). (*see* p. 57.)	

A specimen which cannot be brought into one of these five groups is harmless, except *Azemiops feæ*, which may be known from all other snakes by having 17 rows of scales in midbody, and 6 supralabials, the third of which only touches the eye.

* Since writing this I have seen two specimens of *Callophis macclellandi*, in which the 3rd supralabial just failed to touch the nasals, and as the contact between these shields in many of the species *Callophis* and *Doliophis* is often very small, it is probable that the same departure from the normal may be met with in certain individuals of other species of these genera. For this reason when the 3rd just fails to touch the nasal, I give an alternative method of diagnosis as follows. 3rd supralabial touching the eye, and a suture running from the nostril to the 2nd supralabial. In the genus *Naia* the contact of the 3rd supralabial with the nasal is invariable, and this alternative rule therefore is not intended to apply.

† One harmless snake has a loreal pit, the very rare *Elachistodon westermanni*, but in this the vertebrals are enlarged. Only two examples are known, both from Bengal (Rungpore and Purneah).

GROUP 1.—SEA SNAKES.

Identification.—*Tail compressed* (i.e., flattened like an eel's—see fig.* 1A). *Snout and crown covered with large plate-like shields (see fig.* 6).

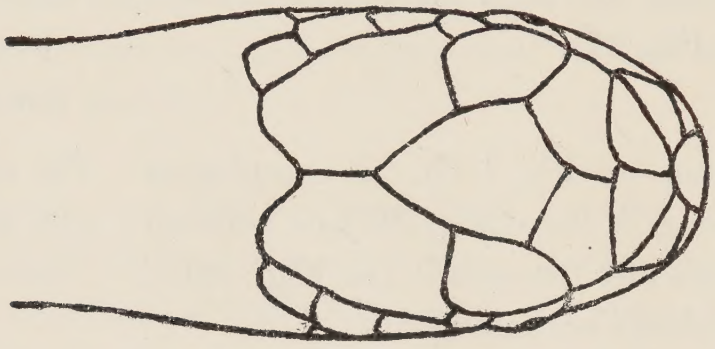

FIG. 6.—Platurus laticaudatus (× 4).

The sea snakes (*Hydrophiinæ*) are all reputed highly venomous. Recent investigation by Rogers† shows that the venom of our commonest species (*Enhydrina valakadyen*) is eight times more potent than that of the binocellate cobra ! There are many published records of fatalities owing to bites from sea snakes, but the name of the offender is rarely, if ever, given, so that our knowledge of the venoms of this family of snakes is extremely meagre,—in fact, we have no certain knowledge of any one of them with the exception quoted above. The recognition of many of the species is extremely perplexing, and in consequence the confusion in terminology is great. Even our best books are very disappointing, and fail to make the recognition of many of them possible.

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* Only one harmless snake has a compressed tail, *viz.*, *Chersydrus granulatus*, an aquatic species found in rivers and seas. In this the snout and crown are covered with small scales only.

† "The Lancet," February 6th, 1904.

GROUP 2.—THE KRAITS *(BUNGARUS).*

Identification.—(1) *Tail round.* (2) *Median row of scales down the back distinctly enlarged (see fig. 7).* (3) *Only 4 infralabial shields, the 4th largest (see I to IV, fig. 8*).*

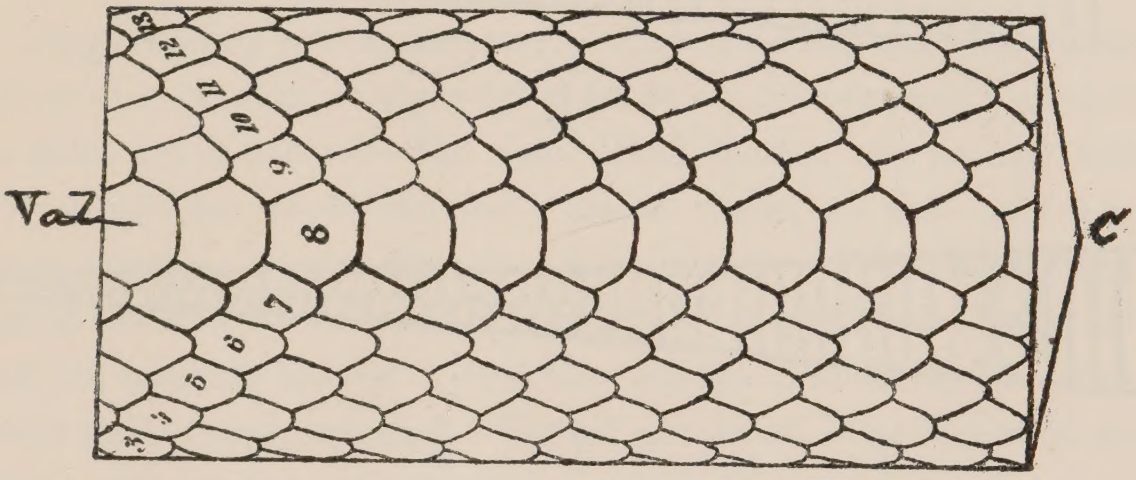


FIG. 7.—Back of Common Krait (Bungarus cæruleus) (× 2).

Val=Vertebrals.

C= Costals.

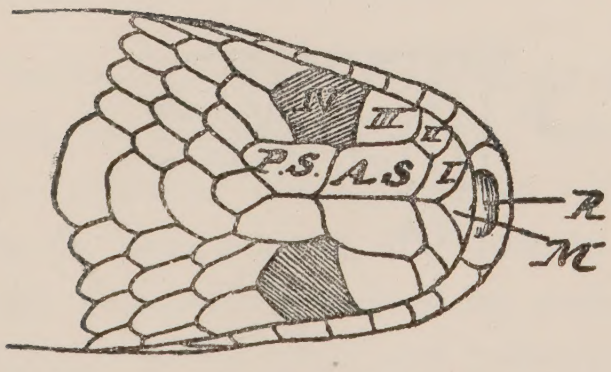
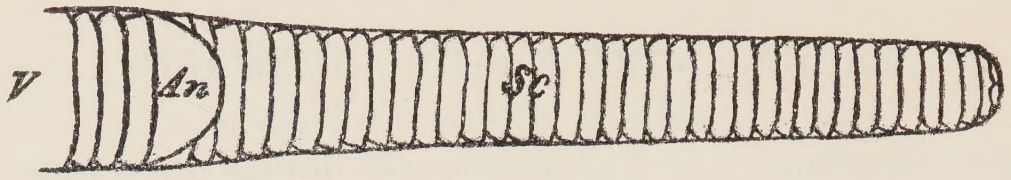
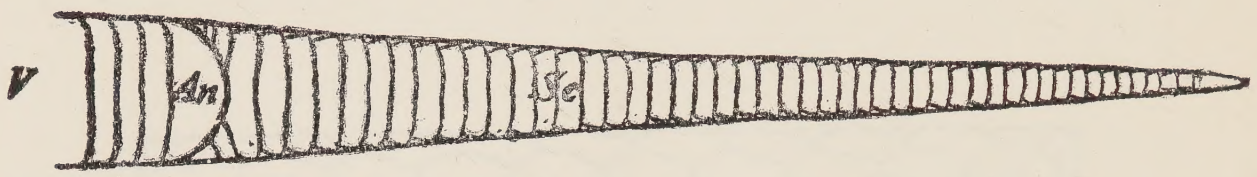


FIG. 8.—Chin shields of Bungarus cæruleus (× 1½).

* With reference to this latter point, care must be taken not to count the first median shield which is called the mental (M.). Again, the last shield along the border of the lower lip which touches the posterior sublinguals (P.S.) is invariably to be considered the last infralabial.



A



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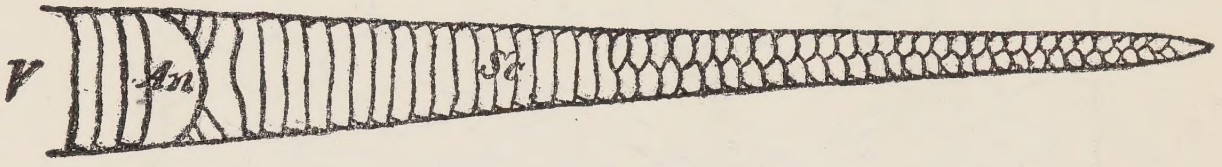
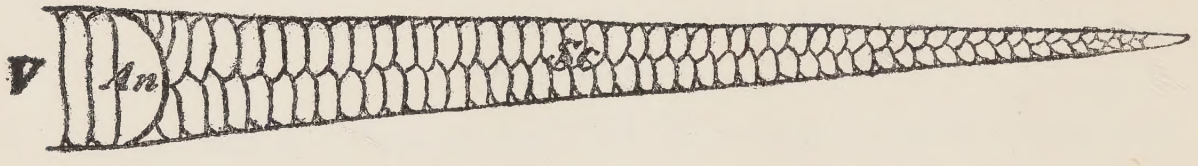


C



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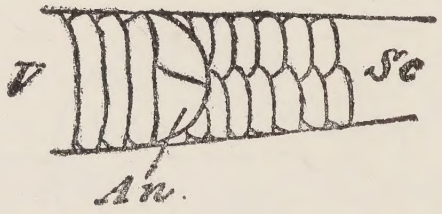

E

V.=Ventrals. An.=Anal. Sc.=Subcaudals.

FIG. 9.

A. Bungarus fasciatus
B. „ cæruleus } .—Subcaudals all entire.

C. „ flaviceps.—Subcaudals entire at base, divided at tip of tail

D. Naia tripudians.—Subcaudals all divided.

E. Hemibungarus nigrescens.—Anal divided.

The first essential point in the identification of a krait is to find the enlarged vertebral row of scales. The enlargement is very obvious, and without this the specimen *cannot* be a krait. Unfortunately, however, for our purpose this distinction is not absolutely confined to the kraits, since a few harmless snakes are similarly distinguished, *viz.*, the genera *Dipsadomorphus*, *Dendrophis*, and *Dendrelaphis*, some species of *Amblycephalus*, *Xenelaphis hexagonotus*, and *Elachistodon westermanni*, and it is due to this fact that other supplementary characters are necessary to formulate a rigid rule.

Supplementary generic characters.—Other important characters to be observed in the scale arrangement of kraits, but not necessarily peculiar to them, are as follows:—The *nasal* shield touches the 1st and 2nd supralabials but never the 3rd. *Loreal* absent, so that only two scales intervene between the eye and the nostril. *Temporal*, a single shield touching the 5th and 6th supralabials. *Supralabials* 7, the 3rd and 4th touching the eye. *Posterior Sublinguals* touch the 4th infralabial shield (rarely 3rd also). The 4th *infralabial* is the largest of the series, and touches only 2 scales behind. The *costals* are the same number in the whole length of the body, except in some specimens of *sindanus* and *walli*. *Anal* entire. *Subcaudals* entire throughout, or in some species only at the base, the remaining shields being divided. The *iris* is black in all species except *B. fasciatus*, in which the pupillary edge is thinly margined golden, and the pupil which is round in form is only discernible during life in this one species.

The shields on the heads of all kraits are so closely similar in number and form that with the exception of the 2nd supralabial they are of no assistance in separating the eight species. The numbers of rows of scales over the back, however, vary from 13 to 19, and the vertebral row varies in breadth in some of the species. The colour, too, is very distinctive in all the species, and habitat is of great importance.

11 of the 12 known members of the genus occur within our Indian limits. Two are common, *viz.*, *Bungarus cæruleus* and *B. fasciatus* but the rest are local and uncommon, some being specially rare.

KEY TO THE KRAITS.

SCALES IN 13 ROWS IN MIDBODY (*see* Fig. 7) .....*Bungarus flaviceps.*

SCALES IN 15 ROWS IN MIDBODY (*see* Fig. 7).

A—SOME OR ALL THE SHIELDS BENEATH THE TAIL DIVIDED (*see* Fig. 9, *C and D*). „ *bungaroides.*

B—ALL THE SHIELDS BENEATH THE TAIL ENTIRE (*see* Fig. 9, *A and B*).

(*a*) Vertebrals narrow, longer than broad, not as broad as the last costal row .... „ *lividus.*

(*b*) Vertebrals broader than long in midbody.

(a^1) 2nd supralabial as broad as 1st and 3rd ... „ *cæruleus.*

(b^1) 2nd supralabial narrower than 3rd and often than 1st.

(a^2) Subcaudals 23 to 40.

(a^3) Tail tapering. Banded black and white. Peculiar to Ceylon ..... „ *ceylonicus.*

(b^3) Tail blunt, finger-like. Banded black and yellow.

Habitat.—Orissa, Assam, Burma, to China ..... „ *fasciatus.*

(b^2) Subcaudals 42 to 57.

(a^3) 11 to 14 white bands on body. 2 to 3 on tail ..... „ *magnimaculatus.*

(b^3) 31 to 48 white bands on body. 11 to 13 on tail ..... „ *multicinctus.*

(c^3) No bands. Uniform black above. „ *niger.*

SCALES IN 17 OR 19 ROWS IN MIDBODY (*see* Fig. 7.)

(A)—VERTEBRALS LONGER THAN BROAD IN MIDBODY. VENTRALS 218 TO 237. PECULIAR TO SIND ..... „ *sindanus.*

(B)—VERTEBRALS BROADER THAN LONG IN MIDBODY. VENTRALS 192 TO 207 PECULIAR TO THE BASIN OF THE GANGES ..... „ *walli.*

Scheme for Identification of the Krats.

Name of species.	Costals.				Ventrals.	Subcaudals.	Some subcaudals divided at tip of tail.	2nd supralabial decidedly narrower than 3rd.	Body compressed.	Number of bands or bars on body.	Number of bands or bars on tail.	Habitat.
	2 heads lengths behind the head.	Midbody.	2 heads lengths before the anus.	Vertebrals in midbody broader than long.								
flaviceps ..	13	13	13	yes	193—226	42—54	yes	?	?	None.		Tenasserim, Cochin China, Malay Peninsula and Archipelago.
bungaroides ..	15	15	15	yes	220—237	44—51	yes	yes	no	Many equidistant white chevrons or lines.		Eastern Himalayas, Khasi Hills, Cachar.
lividus	15	15	15	no	209—215	35—42	no	yes	no	None.		Brahmaputra Basin, South of Himalayas.
caeruleus ..	15	15	15	yes	200—218	38—50	no	no	no	Many white lines in pairs.		Indus Basin, Ganges Basin, Peninsula India and Ceylon.
ceylonicus ..	15	15	15	yes	219—235	33—40	no	yes	no	15 to 20	2 to Complete white bands.	Ceylon.
fasciatus ..	15	15	15	yes	200—234	23—39	no	yes	no	16 to 27	2 to 5 Complete yellow bands	Brahmaputra Basin South of Himalayas, Mahanadi Basin, Irrawaddy Basin, Tenasserim, Indo-China, South China, Malay Peninsula and Archipelago.
magnimaculatus	15	15	15	yes	218—229	42—49	no	yes	no	11 to 14	2 to 3 White bands incomplete ventrally.	Irrawaddy Basin.
multicinctus ..	15	15	15	yes	194—218	45—53	no	yes	no	31 to 48	11 to 13 White bands incomplete ventrally.	Lower Brahmaputra Basin, Irrawaddy Basin, South China to Formosa.
niger	15	15	15	yes	216—231	47—57	no	yes	no	None.		Brahmaputra Basin, South of Himalayas.
sindanus ..	17	17 or 19	17	no	218—237	48—52	yes	no	no	Many white lines in pairs.		Sind.
walli	17 or 19	17 or 19	17	yes	192—207	48—55	no	yes	yes	Many equidistant white beaded lines.		Ganges Basin.
*candidus** ..	15	15	15	yes	210—222	40—50	no	?	no	20 to 25	7 to 9 White bands, incomplete ventrally.	Malay Peninsula and Archipelago.

* Does not occur within our limits.

BUNGARUS FLAVICEPS—The Yellow-headed Krait.

Identification.—It is the only one of the genus with the scales arranged in 13 rows.

Supplementary characters.—The vertebral scales are as broad as long, or even broader in the middle of the body. The subcaudals are entire at the base, and divided towards the tip of the tail (*see* fig. 9 C).

Distribution.—This rare snake belongs to the Malayan fauna, but extends through the Malay Peninsula as far north as Tenasserim, where it encroaches upon our Burmese Province.

Poison.—Nothing seems to be known about the effects of its poison.

Dimensions.—Grows to 6 feet and over.

Colour.—I quote from Boulenger *:—"Black above, with or without a yellow vertebral line, two outer rows of scales black and yellow; head red or yellow; tail and sometimes posterior part of body orange red."

BUNGARUS BUNGAROIDES—The Northern Hill Krait.

Identification.—It is the only krait with scales in 15 rows that has any shields beneath the tail divided. In all the others these shields are entire throughout (*see* fig. 9).

Supplementary characters.—The vertebral scales are as broad as long or rather broader in the posterior part of the body.

Distribution.—This is a very rare species, and a very local one. Hitherto it has only been recorded from the Himalayas in the vicinity of Darjeeling, the Khasi Hills in Assam and N. Cachar.

Poison.—Nothing known.

Dimensions.—Grows to 3 feet.

Colour.—Black with white linear chevrons or crossbars.

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* Cat. Snakes., Brit. Mus., Vol. III, p. 371.

BUNGARUS LIVIDUS.—The Lesser Black Krait.

Identification.—Its uniform black colour taken with the slight enlargement of the vertebral row in which the scales are longer than broad at midbody make its identity easy. Both ventrals and sub-caudals are fewer than in *niger*.

Distribution.—A rare snake. Of 4 specimens in the British Museum 3 are from Assam, and 1 from India, the precise locality of which is not noted. I have lately had a specimen from the Jalpaiguri District and two from Tindharia, E. Himalayas 2,800 feet. Another mentioned by Sclater from Saidpur is probably of this species but I failed to find the specimen in the Indian Museum.*

Poison.—Nothing known.†

Dimensions.—Somewhat uncertain owing to its confusion hitherto with *B. niger*. The largest of 8 I have seen is 3 feet and 2 inches.

Colour.—Uniform black above, white below with more or less dark mottling at the base of the ventrals and sub-caudals.

BUNGARUS FASCIATUS.—The Banded Krait.

The "Raj samp" and "Sankni" of Bengal. Fayrer ‡ says it is called "Koclea Krait" in the North-West. I presume he means N.-W. Bengal, for it does not exist in N.-W. India. According to Russell it is called "Bungarum pamah" on the Coromandel Coast. In Burmah it is known as "Gnandawja," "Ngan-wa," "Ngan-than-kwin-syut," "Nat-mywe," and "Mywe-min."

Identification.—The alternate bands of yellow and black are sufficiently distinctive. The one snake which bears some superficial resemblance to it is *Lycodon fasciatus*, a harmless snake known from the Assam and Burmese Hills. This latter is much smaller, the bands more numerous and their outlines very irregular unlike the banded krait. Moreover, the scale characters mentioned as peculiar to the kraits are all absent in the Lycodon.

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* I have just had a specimen submitted to me for identification, from near Tezpur, Assam, which caused the death of a cooly. No further details have yet been received.

† *See* footnote to *B. niger*. ‡ Thanatophidia, p. 11.

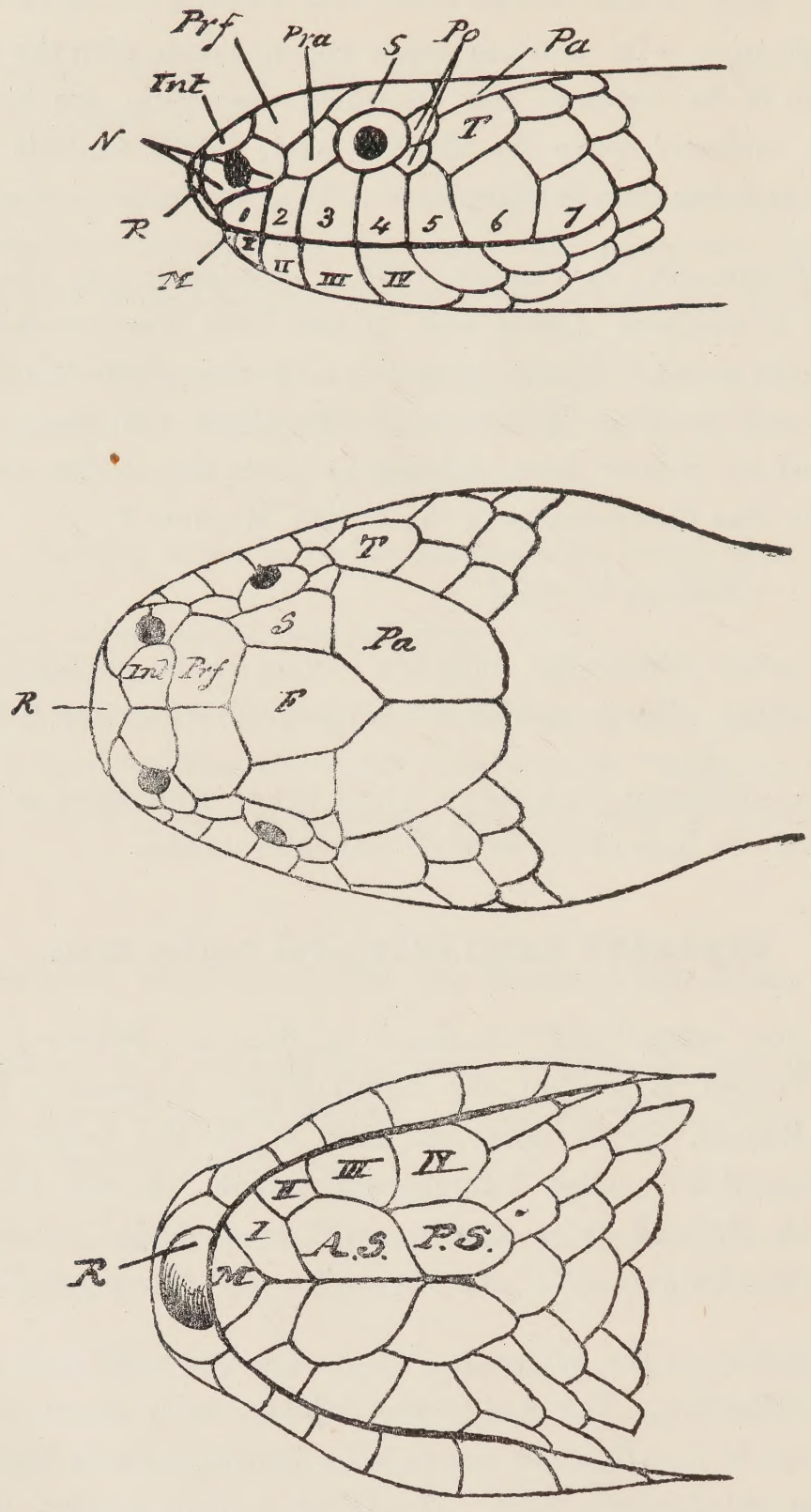

FIG. 10.—Bungarus fasciatus (× 2).

Supplementary characters.—The vertebral row is more enlarged than in any others of the genus, the scales being considerably broader than long. The back is ridged along the spine, and the tail is blunt, and finger-like (*see* fig. 9 A).

Distribution.—From Southern China and the Malayan Subregion, it extends through Tenasserim to the Basins of the Irrawaddy and the Brahmaputra, South of the Himalayas. It is only known from Peninsula India in the North East corresponding roughly to the Basin of the Mahanadi River.* North of the Ganges the most Western limit I know of is Bettiah (N.-W. Behar).

Poison.—Rogers† estimates the virulence of the poison at about $\frac{1}{28}$ that of the common krait *B. cæruleus*. Burmans, who as a race are good observers and not given to romancing like so many of their oriental brethren, declare that the bite is not fatal to man, and as the snake is a very common one in their Province, and very distinctively coloured, I think this testimony worthy of credence. Fayrer‡ mentions one case of bite from this snake. A woman at Tavoy was bitten on the dorsum of the right foot. She suffered tingling, and swelling locally, and some pain in the leg and thigh of that side, but recovered without any constitutional effects. She was treated with ammonia internally, and ipecacuanha, chloroform, and ammonia locally, none of which we know have the slightest beneficial effects in snake bite.

Russell's ¶ experiment on a fowl caused it to die 26 minutes after being bitten. Fayrer§ tested its effect on fowls, death being caused in 17, 18 and 26 minutes, 1 hour 55 minutes, and 26 hours 18 minutes.

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* There is one specimen in the British Museum presented by Colonel Beddome, and labelled from the Anamallays. This is the sole record of this snake in Peninsula India outside the limits specified above.

The accuracy of Beddome's record is shattered by the following facts. He records no less than 7 other species from Southern India, not known otherwise from this area. These are *Tropidonotus parallelus*, *T. subminiatus*, *T. himalayanus*, *Lycodon jarà*, *Simotes splendidus*, *S. octolineatus*, and *Dendrelaphis caudolineatus*. All of these snakes are known otherwise from areas in which *Bungarus fasciatus* occurs. Now it is certain that Beddome received snakes from Burma and Tenasserim because there are specimens in the British and Indian Museums presented by him from those areas, viz., *Simotes cruentatus*, *S. violaceus*, *S. cyclurus* and *Dipsadomorphus hexagonotus*. From these facts it would appear that specimens from Burma and Tenasserim including one of *Bungarus fasciatus* had been mixed up with his Southern Indian collections.

In proof of these statements, *vide* Boulenger's Catalogue of Snakes 1893 to 1896 and Sclater's list of Snakes in the Indian Museum, Journal Asiatic Society of Bengal, Vol. LX, 1891.

† "Lancet," February 6th, 1904, p. 349 *et seq.*

‡ "Thanatophidia," p. 45.

¶ Indian Serpents, pp. 4 and 5.

§ *Ibid*, pp. 84, 85, 101, 120, 134

Again Fayrer's* experiments on dogs produced a fatal issue in intervals varying between 4 hours and 28 minutes to 10 days. All these creatures were bitten in the thigh. They appeared to suffer little pain, but exhibited restlessness, and then walked a bit lame. Dejection of spirits followed, and salivation, retching, or vomiting were very constant, and in one case persistent cough. The gait became uncertain, and staggering, till muscular weakness prompted a recumbent posture. The breathing became affected, and in two cases some muscular spasms were noted. In at least 3 cases the animals partially recovered or the symptoms abated for a time, but death supervened after some days. In one case there was diarrhœa, and in another some mucosanguineous dejecta were occasioned. The blood in all cases coagulated firmly after death. These experiments all tend to confirm the veracity of Burmese statements. Compare for instance these with experiments with cobra and daboia poisons (*q. v.*).

Dimensions.—It grows to 6 feet and over.

Colour.—Alternately and completely banded black and yellow.

BUNGARUS MAGNIMACULATUS.—The Burmese Krait.

Identification.—It has broader and fewer bands than any other krait.

From *candidus* with which it has been confused it is known by its colour, and habitat.

From *cæruleus* it is known from the larger number of ventrals (218-229), the narrow 2nd supralabial, colour, and habitat.

From *multicinctus* it is known by the larger number of ventrals, colour, and more restricted habitat.

Distribution.—At present known from a very restricted area within the basin of the Irrawaddy.† It is the only krait peculiar to Burma.

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* "Thanatophidia," pp. 68, 69, 84, 99, 101, 107 and 118.

† Monywa, Meiktila, Wall and Evans. Bomb. Nat. Hist. Jourl., Vol. XII, p. 611, and Meiktila, Sclater, Jourl. Asiat. Soc., Bengal, Vol. LX, p. 245. Hmawbi, Myingyan, and Shwebo District, Evans.—In Epistola.

Poison.—Nothing known.

Dimensions.—Grows to 4 feet 3½ inches.

Colour.—Black with 11 to 14 light bands on the body and 2 or 3 on the tail. These bands are white streaked with black lines in the length of the snake. Belly quite white.

BUNGARUS MULTICINCTUS.—The Many Banded Krait.

Identification.—This species has more bands than any other krait.

From *cæruleus* it is distinguished by the narrow 2nd supralabial, its colour, and habitat, from *candidus* by colour, and habitat, and from *magnimaculatus* by the fewer ventrals, colour, and habitat.

Distribution.—Rare in Burmah. Evans and I obtained one from Insein, another dubiously from Rangoon, and there is a specimen in the British Museum from Toungoo. Two specimens in the Indian Museum are labelled Purneah. Occurs also in Southern China, Hainan, and Formosa.

Poison.—Nothing known.

Dimensions.—3 feet 8 inches is the largest measurement I know.

Colour.—Black with from 31 to 48 pure white bands on the body, 11 to 13 on the tail. Belly white.

BUNGARUS NIGER.—The Greater Black Krait.

Identification.—Quite black or blue-black above, with the vertebrals broader than long in the middle of the body. The ventrals and subcaudals are more numerous than in *lividus*.

Distribution.—I obtained seven specimens in Dibrugarh and one from Sadiya Assam, and have lately received four from the Eastern Himalayas Tindharia 2,800 feet, and Pashok 2,000 to 4,500 feet. Sibsagar and Garo Hills (Sclater.)*

*Sclater (in the Jourl., Asiat. Soc., Bengal, Vol. LX., p. 246) mentions 3 specimens under the title *Bungarus lividus*. He notes that two of these have the vertebrals broader than long. These, I have examined. Those from Sibsagar and the Garo Hills are *B. niger*. The third specimen from Saidpur (Dinapore District) is probably the true *lividus* but I failed to find it.

Poison.—Nothing known.

Dimensions.—My largest specimen was 4 feet and half an inch.

Colour.—Uniform black above. Belly white with more or less dark mottling at the base of the posterior ventrals and sub-caudals.

BUNGARUS CEYLONICUS.—The Ceylon Krait or Karawala.*

Identification.—The bands are complete. It is the Common Krait of Ceylon.

Supplementary characters.—The vertebral row is unusually large, the breadth of the scales considerably exceeds the length, and in this respect it almost compares with *B. fasciatus.*

Distribution.—Peculiar to Ceylon.

Poison.—The only cases of bites from this snake known to me are reported by Mr. E. E. Green (Spol. Zeylan. April 1908, p. 103) and Dr. Willey (Spol Zeylan. April 1906, p. 228). In the former record a cooly was bitten in the left foot at 4 a.m. At 5-30 a.m. he was sleepy and drowsiness increased till 10 a. m. When dosed with whisky shortly afterwards swallowing was difficult and vomiting ensued. He walked about till his legs refused to move. At 2 p.m. he was feverish and insensible and he died at 4 p.m.

In Dr. Willey's case a Malay woman bitten in Colombo succumbed within 12 hours.

Dimensions.—Grows to 3 feet and over.

Colour.—Glistening black with white cross bars.

BUNGARUS CÆRULEUS.—The Common Krait.

(Synonym—*B. arcuatus.*)

The "Karait" and "Dhomum chitti" or "chit ti" of Bengal. "Valla pamboo" of Malabar. "Katto virian" and "Anali" of Madras. The "Godi năgera" of Mysore according to Rice, and the "Gedi paragoodoo" and "Pakta Poola" of the Coromandel Coast (Russell).

* Gunther and other Authors have wrongly used this as the Singhalese name for *Ancistrodon hypnale.* Ferguson, Willey, and others have, however, shown this a mistake.

Identification.—The linear white arches, taken with 15 scale rows and the undivided subcaudals (see fig. B) suffice to declare its identity. One important feature for those to note who in spite of all precautions persist in trying to identify their specimens by colour and markings instead of by conformation and relationship of shields, is the fact that in all the snakes which resemble this species in colour, *viz.*, *Lycodon aulicus* (certain varieties) and *L. striatus*, together with *Dryocalamus nympha*, *D. gracilis* and *D. davisoni*, the white cross bars are most evident in the anterior part of the body, and gradually fade posteriorly till they are often lost. It is characteristic of this krait, however, that the white bars are most distinct posteriorly, and often fade away anteriorly—in fact, the anterior one-third or one-half of the body is frequently without marks in adults.

Supplementary characters.—In the vertebral row the scales are about as broad as long in the middle of the body (see fig. 7). The 2nd supralabial is peculiar in being as broad as the 3rd.

Distribution.—Throughout the Indus Valley, the Ganges Valley, Peninsula India, and Ceylon. It has been found up to 4,000 ft., but is essentially a snake of the plains. It is very rare in Ceylon.* It is the only Krait found in Peninsula India South of the Ganges Basin.

Poison.—This is known to prove fatal to man, but the literature on this very common species makes remarkably few references to cases of its bite. The reason must be assigned, in great measure, to the

* There are 5 specimens of this snake in the British Museum, presented by Cantor from the Malay Peninsula. I think there are good grounds to discredit the accuracy of this record. It is noteworthy that six other Indian Snakes are recorded from the Malay Peninsula on the sole authority of Cantor, *viz.*, *Typhlops bothriorhynchus*, *Polyodontophis sagittarius*, *Xenochrophis cerasogaster*, *Zamenis fasciolatus*, *Helicops schistosus* and *Hypsirhina sieboldi*. All of these snakes are known from Bengal but not as far East as Burma. Now it is certain that Cantor received snakes from Bengal because specimens of the following species are given in his name from Bengal to the British Museum, *viz.*, *Polyodontophis sagittarius*, *Xenochrophis cerasogaster*, *Lycodon jara*, and *Hypsirhina enhydris*. Under these circumstances one cannot escape the conviction that the snakes above enumerated together with 5 *Bungarus cæruleus* were received by him from Bengal and inadvertently mixed with his Malayan collection. Further Boulenger has cast doubts on the locality of a specimen of *Dryophis mycterizans* presented to the British Museum by the same collector labelled from Assam. In support of these statements *vide* Boulenger's Catalogue of Snakes in the British Museum, 1893 to 1896.

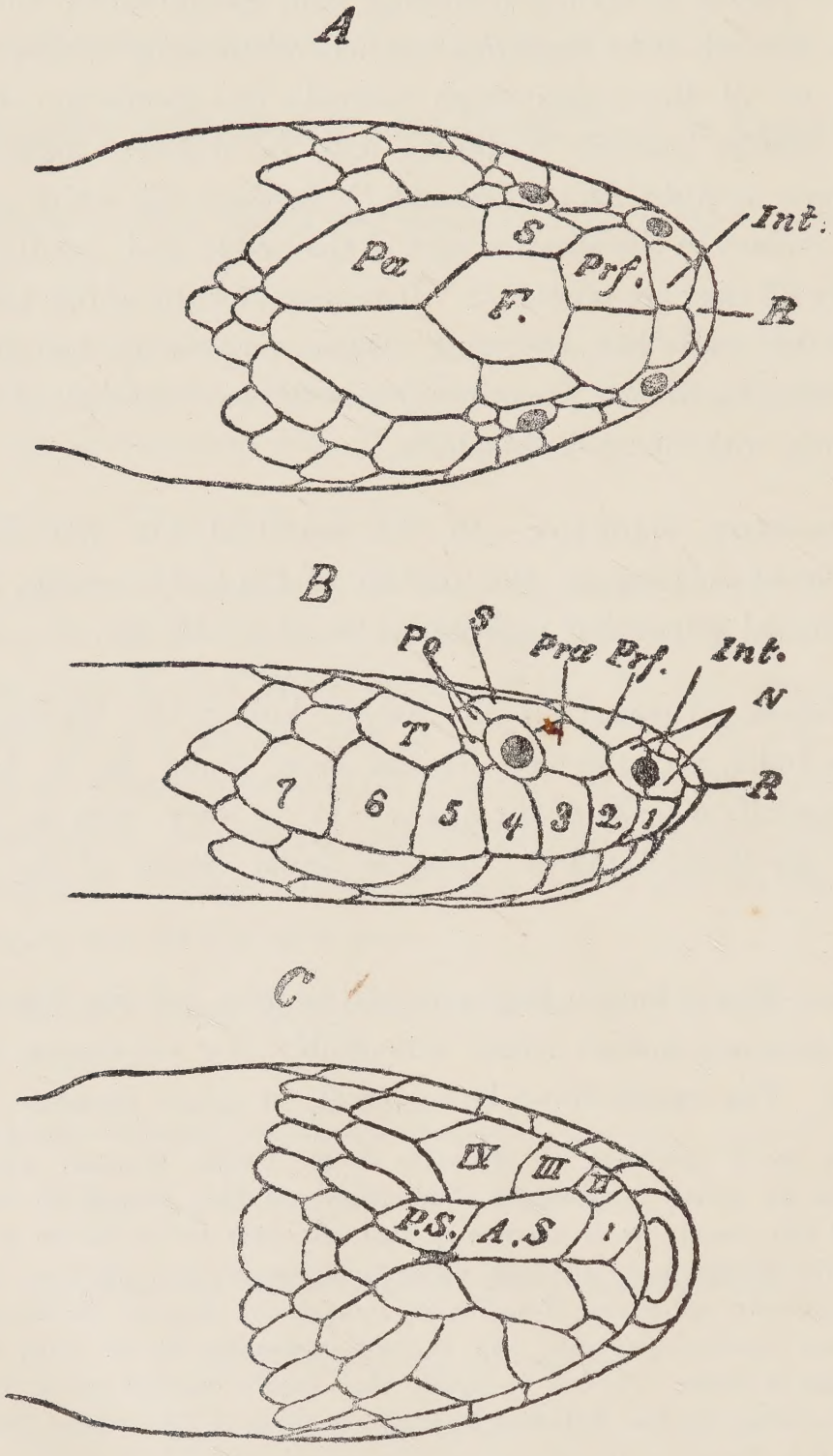

FIG. 11.—Bungarus cæruleus.

inability of medical men to recognise it. Rogers* estimates that the poison is nearly twice as virulent as that of the binocellate cobra.

Fayrer† records a case where 4 men were bitten by the same krait. This occurred at night, all men being prevailed upon to submit themselves to the bite of a specimen about 3 feet long in the possession of some snakemen, who vouched that no evil effect should befall them. The first man bitten complained of thirst and foamed at the mouth, and died before dawn. The second and third men died at about noon the next day, and the fourth man recovered. He suffered from giddiness, perspiration, pain in the stomach and unconsciousness, and he remained in hospital 5 or 6 days. Fayrer‡ records another case where a chowkidar was bitten in the forefinger. He suffered burning pain in the finger, later on in the head, and then over the whole body; he became weak, could hardly articulate, and then got drowsy. He vomited after some native medicine, then lost the power of swallowing, and died in 6 hours. Again Fayrer § records the case of a man bitten in the finger who experienced great pain in the wound, and the hand swelled up to the wrist. His breathing became short and hurried, he complained of constriction round the chest, became drowsy, and then insensible. He died in 3 hours, frothy mucus oozing from the mouth and nostrils. Elliot¶ records a case where a sepoy was bitten on the inner side of his ankle, and death supervened in 31 hours.

The results of Fayrer's experiments on fowls were that death supervened in 4, 7, 17, 20, 32, 43½ and 44 minutes, 1 hour 48 minutes, and 2 hours 22 minutes. On dogs, death occurred in 52 minutes, 2 hours 15 minutes, 3 hours 42 minutes, and on the third day after the bite was inflicted. These dogs exhibited the following symptoms:—restlessness, salivation, vomiting, depression, paralysis, involuntary discharges, laboured breathing, convulsions passing on to death. In all cases where mention is made of the blood both in fowls and in dogs it clotted firmly after removal from the blood vessels.

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* The Lancet, February 6th, 1904.

† Thanatophidia, p. 51.

‡ *Ibid*, p. 54.

§ *Ibid.*, p. 60.

¶ Trans. Brit. Med. Association, S. Ind. Br., 1895, p. 31.

Dimensions.—Grows to 4½ feet. I have measured a skin 4 feet 6½ inches.

Colour.—Glistening black with linear, white arches thrown in pairs across the back, sometimes more or less absent in front. Belly white.

BUNGARUS SINDANUS—The Sind Krait.

Called by the natives of Upper Sind "Pee-un".

Identification.—This has the scales over the back in 17 (or 19) rows, and the first three supralabials equally broad.

Supplementary characters.—The vertebrals are slightly longer than broad in the middle of the body. The subcaudals are sometimes divided towards the tip of the tail (as in fig. 9 C).

Distribution.—Peculiar to Sind,* where it is reported to be common in the upper part of that region.

Poison.—Nothing known.

Dimensions.—Grows to 6 feet.

Colour.—Black with white cross bars most evident posteriorly. It is extremely like the common krait, *B. cæruleus* in general appearance.

BUNGARUS WALLI—Wall's Krait.

Identification.—Scales in 17 or 19 rows, and the vertebral row in midbody with scales much broader than long.

Supplementary characters.—The 2nd supralabial is conspicuously narrow, compared with the 1st and 3rd. The ventrals are fewer (198 or 207) than in *sindanus* (220 to 237).

Distribution.—Known from the United Provinces (Fyzabad), where I obtained 8 specimens, Midnapore, and Purneah.†

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* See footnote to *B. Walli.*

† I have lately seen two specimens in St. Joseph's College (Darjeeling), part of Dr. Vincent Richard's collection, locality not known but probably Bengal. The specimen referred to by Dr. Annandale from Midnapore (J. A. S. B. 1905 I-8 p. 13) as *sindanus* is this species and I have seen 3 in the Indian Museum from Purneah.

Poison.—Nothing known.

Dimensions. —The largest record was 4 feet $11\frac{3}{4}$ inches.

Colour.—Mercurial-black with equidistant white bars formed of roundish white spots. These are not arranged in pairs in the manner so characteristic of *cæruleus*, and *sindanus*. The tail is mottled beneath towards its tip again unlike *cæruleus* and *sindanus*.

GROUP 3.—COBRAS AND CORAL SNAKES.*

Identification.—(1) *Tail round.* (2) *The 3rd supralabial shield touches the nasal, and the eye* (*see fig.* 12).†

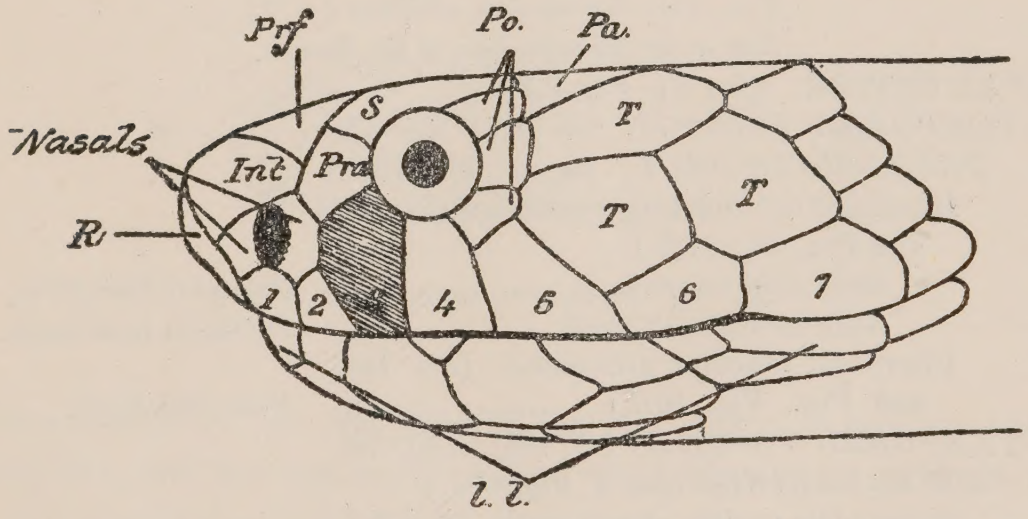

FIG. 12.—Naia tripudians (× $1\frac{1}{2}$).

* The name coral snake is applied to a South American poisonous species, *Elaps corallinus*. I use the title here for those snakes which are allied to the above and to which I think the term singularly appropriate, since most of them have bellies adorned with a most beautiful colouring resembling pink coral. This, however, disappears after a day or two's immersion in spirit.

† I am only aware of one harmless snake in which the 3rd supralabial touches the nasal shield, *viz.*, *Xenopeltis unicolor*, and in this case it fails to touch the eye. (*See* fig. 13.)

This second feature alone separates the members of this group from *all* other snakes (*see* footnote, page 6). The group comprises 4 genera, and includes 9 species.

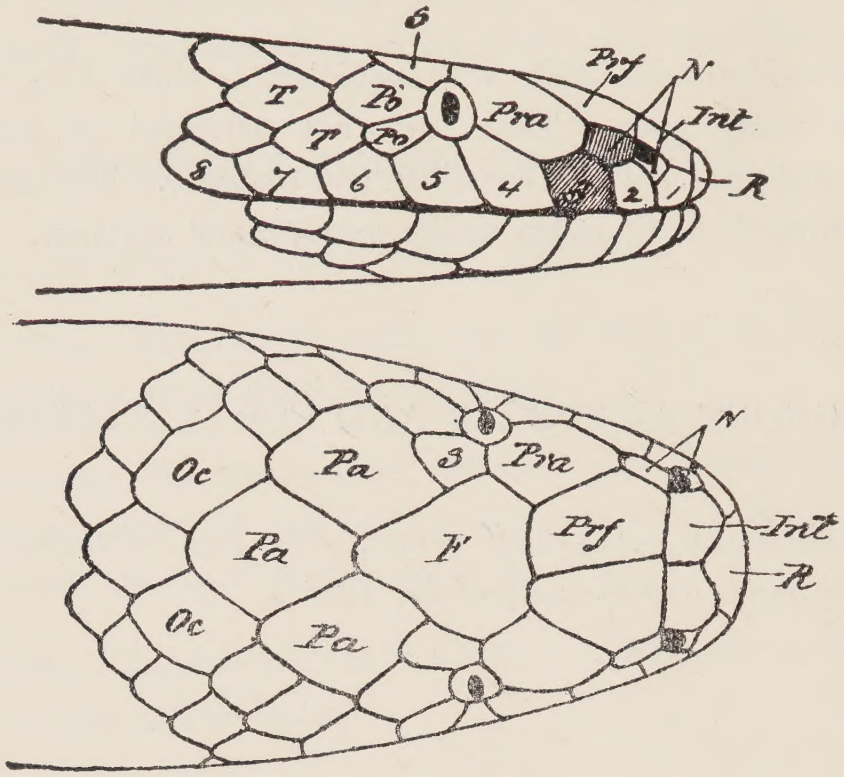

FIG. 13.—Xenopeltis unicolor (× 2).

Key to the identification of the Species.

ANAL ENTIRE. (*See* An. Fig. 9.)

TEMPORAL TOUCHES 5th AND 6th SUPRALABIALS ONLY. (*see T*, Fig. 15*B*.)

Internasal not touching præocular. (*See* Int. and Pra., Fig. 15*B*.)

Belly uniform red ..... *Doliophis bivirgatus.*

Belly barred with black ..... *Doliophis intestinalis.*

Internasal touching præocular. (*See* Int. and Pra., Fig. 16*B*.) .... *Naia tripudians.*

TEMPORAL TOUCHES 5th, 6th, AND 7th SUPRALABIALS. (*See T*, Fig. 18*A*.)

Subcaudals at base of tail entire. (*See* Sc., Fig. 9*C*.) ..... *Naia bungarus.*

Subcaudals divided throughout. (*See* Sc., Fig. 9*D*.) ..... *Callophis bibroni.*

ANAL DIVIDED. (*See* An. Fig. 9.)

TEMPORAL TOUCHES 5th AND 6th SUPRALABIALS. (*See T*, Fig. 20*B*.)

Supralabials 6. (*See* Fig. 21*B*.) ..... *Callophis trimaculatus.*

Supralabials 7. (*See* Fig. 20*B*.) ..... *Callophis macclellandi.*

TEMPORAL TOUCHES 5th, 6th, AND 7th SUPRALABIALS. (*See T, fig.* 18*A*.)

Tail with 2 black bands ..... *Callophis maculiceps.*

Tail with no band .... *Hemibungarus nigrescens.*

DOLIOPHIS BIVIRGATUS—The White-striped Coral Snake.

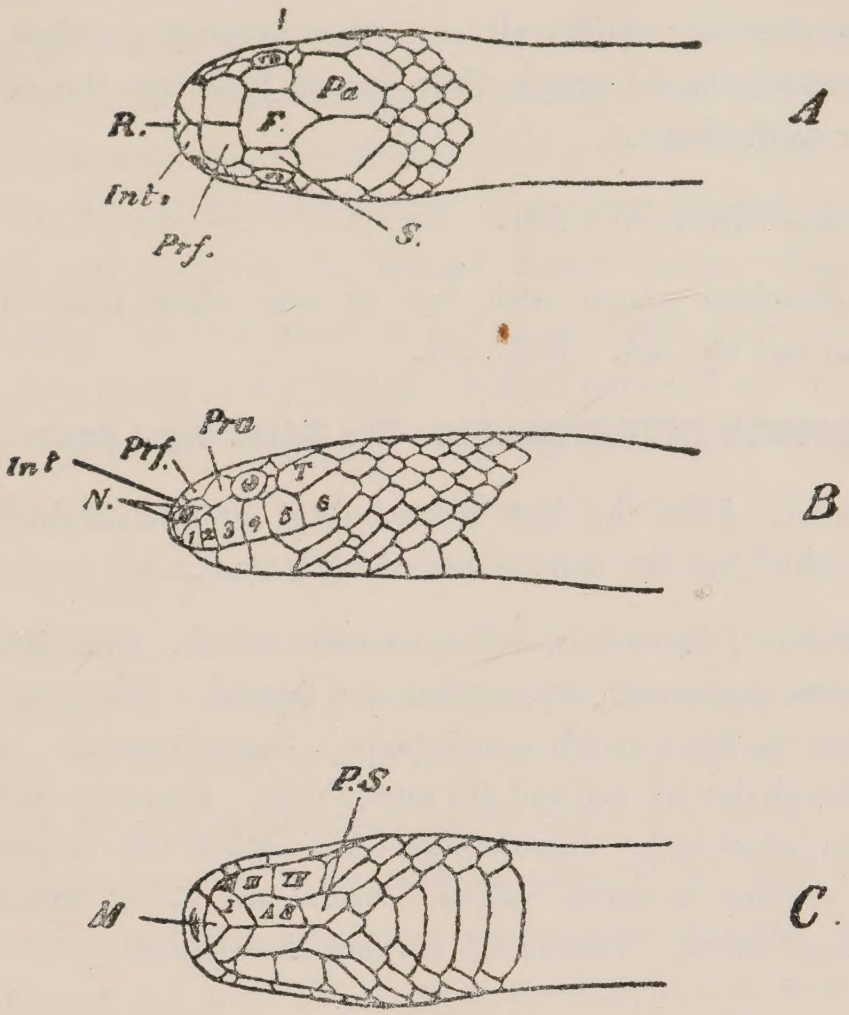

FIG. 15.—Doliophis bivirgatus. (× 1).

Identification.—This and the next species agree in having only 6 supralabials, and the anal shield entire, which characters serve to distinguish them from all the rest of the group. The belly in this snake is uniform red in colour.

Supplementary characters.—*Præfrontals* touch the internasal, posterior nasal, præocular, supraocular and frontal. *Temporal.*—One, which touches the 5th and 6th supralabials. *Supralabials* 6. *Anterior sublinguals* touch the 1st, 3rd and the 4th only of the infralabials. *Posterior sublinguals* touch the 4th infralabial only. *Infralabials.*—The 4th is the largest of the series, and touches 2 scales behind. *Scales* are 13 in whole body. *Anal* entire. *Subcaudals* divided throughout.

Distribution.—This Malayan form extends into our Burmese territory, where, however, it is rare.

Poison.—Nothing is known about it. The poison glands in this and the next are peculiar; unlike all our other poisonous snakes, instead of being confined to the temple they extend back into the abdominal cavity as far as the heart.

Dimensions.—Grows to 5 feet.

Colour.—Blackish above with two or four white lines down the back. Head and tail red. Belly red.

DOLIOPHIS INTESTINALIS—The Belted Coral Snake.

Identification.—Like the last it has only 6 supralabial shields, and the anal is entire, but the belly is barred with black.

Supplementary characters.—*Præfrontals* touch the internasal, posterior nasal, præocular, supraocular and frontal. *Temporal.*—One, which touches the 5th and 6th supralabials. *Supralabials* 6. *Anterior sublinguals* touch the 1st, 3rd and 4th infralabials. *Posterior sublinguals* touch the 4th infralabial. *Infralabials.*—The 4th is the largest of the series, and touches 2 scales behind. *Scales* are 13 in whole length of body. *Anal* entire. *Subcaudals* divided throughout.

Distribution.—This like the last belongs to the Malayan fauna, but is said to extend into Burmah.

Poison.—Nothing known as far as I am aware, though it appears to be fairly common in parts of the Malayan region.

Dimensions.—Grows to 2 feet.

Colour —Boulenger* says: "Brown or blackish above, with darker or lighter longitudinal streaks; tail pink or red beneath; belly with black crossbars."

NAIA TRIPUDIANS—The Cobra.

Vernacular names.—According to Fayrer the spectacled or binocellate cobra is called "gokurrah" about Calcutta and the monocellate variety, which exhibits a single spot on the hood subject to much

* Cat. Snakes, British Museum, Vol. III, p. 402.

variation in size and shape, the "keautiah." Both names appear to receive further qualification according to variations in colour. I have never heard these names in other parts of India, and it is probable that they are peculiar to Bengal. The former is the common variety in the Indian Peninsula, in which region the latter is decidedly rare according to my experience, but the converse holds good in Burmah and further East. In Bengal the distribution of the two forms seems to overlap, and both are common. In Bengal I have heard "Nag samp" and "Kala samp" as frequently in use as in other parts of India. In Madras it is called by the Tamils "Nalla Pāmboo," and on the Malabar Coast is known as "Sairpoon" and "Moorookan." In Mysore it is the "Nagara havoo," and according to Russell "Nagoo" on the Coromandel Coast. It is the "Mwé howk" of the Burmese.

Identification.—I have no doubt that to most people living in India, the recognition of a cobra seems a very simple thing, and this is true as a rule. If the snake is seen alive at close quarters with the hood expanded, its identification will hardly admit of a doubt. Still it must be remembered that the hamadryad expands its hood to an almost equal degree, and that certain harmless snakes, especially the Keelbacks (*Tropidonoti*, and their allies), erect themselves, and flatten the neck, though to a lesser degree. The spectacle mark on the hood of the binocellate cobra, and the oval spot surrounded by an ellipse on the hood of the monocellate or Burmese variety, are both of them quite distinctive of this species, and if constant would make diagnosis invariably easy. Many cobras, however, have these marks so modified or obscured that most people unfamiliar with this subject, would fail to recognise them if reliance is placed on these alone.

After death the hood is obliterated, and if the creature is stiff cannot be readily demonstrated, and I have frequently under these conditions known people express surprise when told that a specimen is a cobra, shake their heads, and think they know better. Again, I have seen the loose skin about the neck of a harmless snake pulled out, and a hood claimed where none existed, so that one

must admit that in a few cases, at least, the cobra is not recognised, and sometimes a harmless snake is mistaken for it. Nicholson's footnote on page 159 of his work on Indian snakes is a striking corroboration of my own experience. He says: "I have seen an Englishman, considered "rather an authority on snakes, declare that a *Ptyas mucosus* "(now *Zamenis mucosus*) just brought to me was a cobra; he even "pointed out the poison-fangs." So long as people continue to be guided by these faulty characters in diagnosis, mistakes are sure to occur.

Now there are one or two very distinctive peculiarities about the scales of a cobra which if looked for should place its identity beyond question. These are as follows :—

*The præocular shield touches the internasal** (*see* Pra. and Int., fig. 16 B). In only two other snakes is this relationship to be found, *viz.*, in *Xylophis perroteti*, a small harmless snake peculiar to the hills of Southern India, and the rare *Amblycephalus monticola*. In both the 3rd supralabial shield does not touch the nasal.

Between the 4th and 5th infralabial shields a small wedge-shaped scale occurs, the "cuneate" (*see* fig. 16 B). Sometimes a second or even a third similar scale borders the lower lip. This scale may easily be overlooked, lying partly or wholly concealed, as it may do, by the overlapping of the upper lip, so that the mouth should be opened when looking for it. It occurs in no other land snake. I have never even observed it in the hamadryad, but it is seen in a few species of sea-snakes. A head is rarely so broken that one or other of these points cannot be made out on one side. If, however, the head is mutilated beyond recognition there is one feature about the scales over the back of a cobra which is peculiar to itself. It is the concavity in the arms of the bracket-shaped pattern which these form, and which I have shown by thickened lines in fig. 17. Beside this, I have placed another drawing to illustrate what is seen in other snakes, the pattern forming a chevron.

* This is a very easy point to determine if it is remembered that the shields immediately behind the rostral (in land colubrines) are called internasals, and the shields touching the eye in front the præoculars. In the instances where the præfrontal shield touches the eye as in Fig. 19, it is obvious that this shield from its size and position has a prior claim to be considered a præfrontal, and in such a case the præocular is said to be absent.

This is perhaps rather a nice point which may require a practised eye to

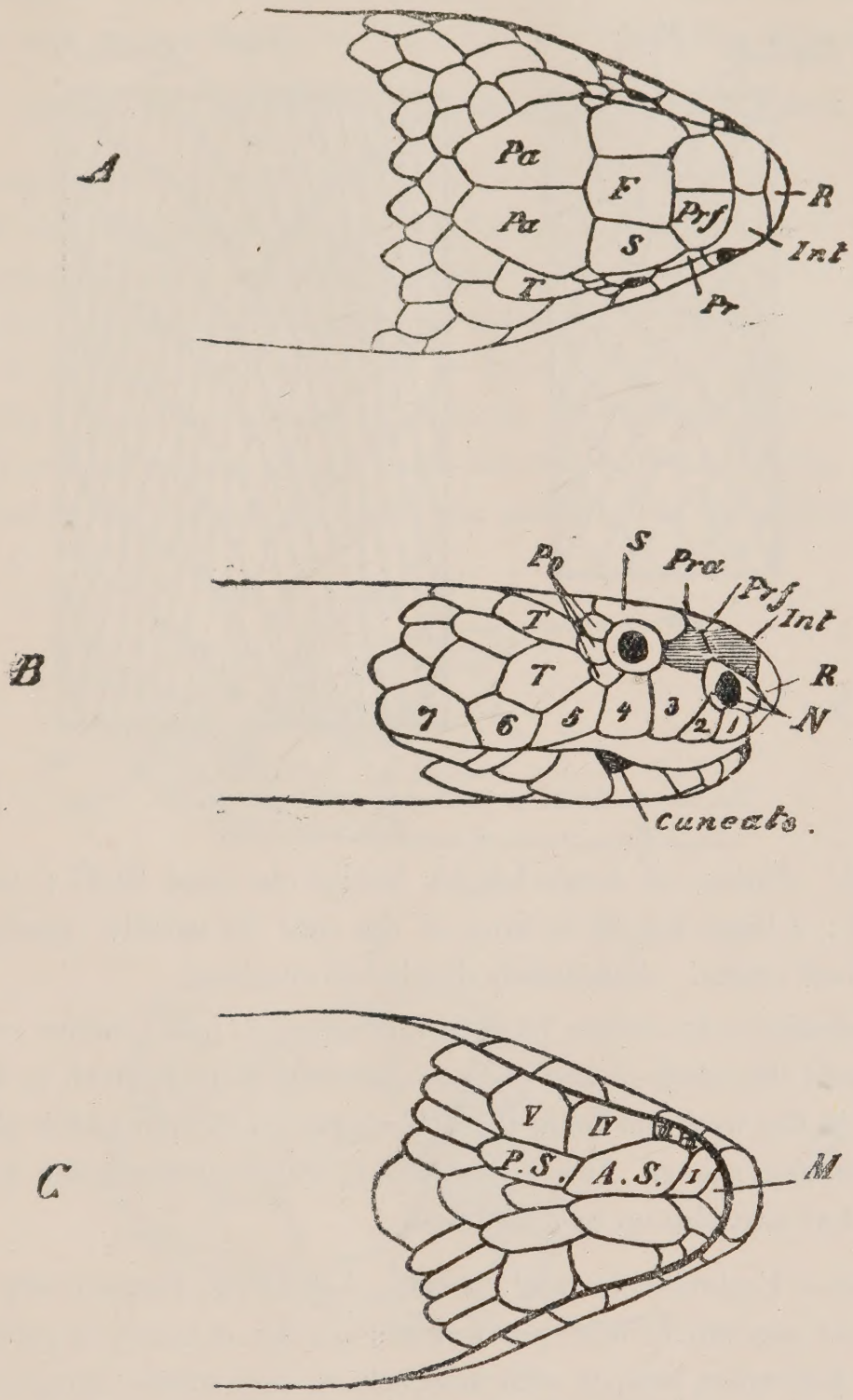

FIG. 16.—Naia tripudians (nat. size).

determine positively, but to an observant enquirer there should be little difficulty, and with proper care the character is a very valuable one.

Supplementary characters.—*Præfrontals* touch the internasal, præocular, supraocular, and frontal. *Temporals* 2, the lower touching the 5th and 6th supralabials. *Supralabials* 7. *Anterior sublinguals* touch 4 infralabials. *Posterior sublinguals* touch the 4th and 5th infralabials

Infralabials.—The 4th and 5th are the largest of the series, and about

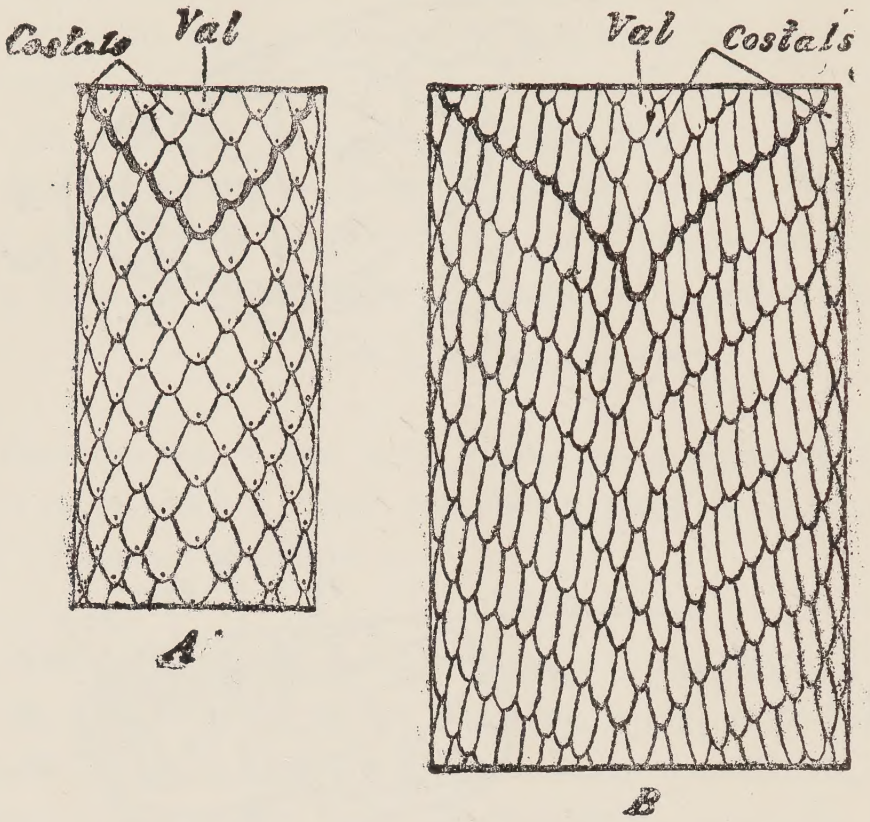

FIG. 17—A. Scales on back of Lycodon aulicus.
B. „ „ Naia tripudians.

subequal. *Scales.*—2 heads length behind the head 19-27; midbody 19 to 27; 2 heads length in front of the vent 15 usually (rarely 13 or 17). *Anal* entire. *Subcaudals* divided throughout.

Distribution.—It occurs in one or other of its many colour varieties throughout the whole of our Indian possessions from Burmah in the east to Sind in the west and from the Himalayas to Ceylon and is always a fairly common snake. It is an inhabitant of the plains, but it has been recorded at altitudes up to 6,000 feet.

Poison.—Undoubtedly fatal to man, but by no means every case of cobra bite necessarily will prove fatal; on the contrary a percentage, hard to determine, escapes with moderate or very severe symptoms, the dose injected being less than the lethal. Fayrer records many fatal cases. In 8 of these cases stated to be due without doubt to the bite of a cobra, in all of which no treatment was tried, the victims died in from ½ to 3 hours.

Dimensions.—Grows to 6 feet 5½ inches, but 6 feet is a very exceptional length.

Colour.—Very variable. It may be any shade, from buff or wheat colour to olivaceous, brown, or tarry black and even foliage green

(N. Siam). These hues are uniform, or more or less variegated. The hood may be without marks, or adorned with a spectacle-like device, or an oval spot surrounded by an ellipse or various modifications of these.

NAIA BUNGARUS—The Hamadryad or King Cobra.

Identification.—A pair of large shields are *in contact with one another*, behind the parietals (*see* Oc., fig. 18), and this alone will serve to distinguish this from every other snake.* Even if the head is badly mutilated I think this feature will be made out. In case, however, the point is dubious, the snake will be known by the existence of the following 2 characters which must co-exist. The shields under the base of the tail are entire, whilst those towards the extremity are divided, and the vertebral row of scales is similar in size and shape to the adjacent rows.

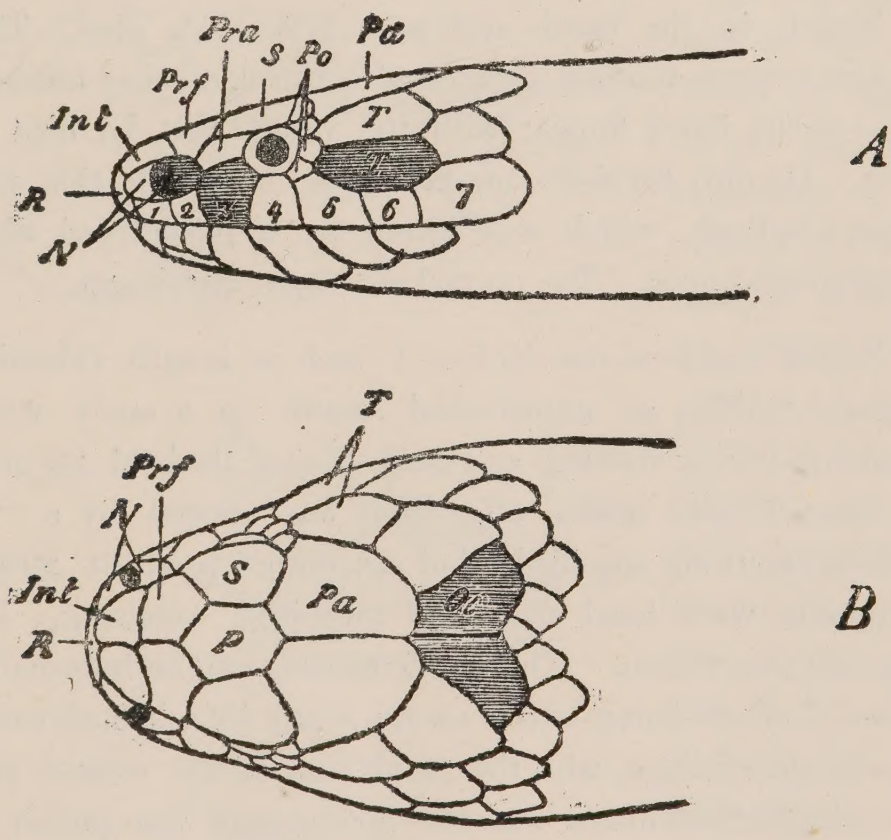

FIG. 18.—Naia bungarus ($\frac{2}{3}$ nat. size).

Supplementary characters.—*Præfrontals* touch the internasal, posterior nasal, præocular, supraocular, and frontal. *Temporals* 2, the lower touching the 5th, 6th and 7th supralabials. *Supralabials* 7. *Anterior sublinguals* touch 4 infralabials. *Posterior sublinguals* touch the 4th and 5th infralabials. *Infralabials.*—The 5th is the largest of the series

* In almost every other snake the parietals are succeeded by small scales, and in the rare exceptions where occipitals are present, they do not touch one another (*see* Oc., fig. 13).

and touches 2 scales behind. *Scales.*—2 heads lengths from head 17 (rarely 15) mid-body 15, 2 heads lengths in front of vent 15. *Anal* entire.

Distribution.—It is found throughout our Indian domains (with the exception of Ceylon, and I believe Western Rajpootana, Sind, and the Punjab?) in suitable localities, that is, in jungles or their vicinity. It occurs in the plains, and in hilly regions up to an altitude of 7,000 feet at least.

Poison.—Undoubtedly fatal to man, but it is remarkable that a copious literature on this renowned snake, which is known to frequently show a most aggressive spirit, should furnish so few records of its bite. Theobald* saw a snake-charmer bitten by one in Burmah die within a few minutes.

Evans† mentions a case of a foolhardy Burman, believing himself snake-poison-proof, teasing one belonging to a Shan snake-charmer. He was bittten in the hand, and soon afterwards died. The same observer also records another instance of a Burman being bitten by one in the base of the index finger, with the result that he died shortly afterwards. He also furnishes another case in which this time the victim was a bullock, which was bitten by a hamadryad which the bullock cart passed over. The animal died soon afterwards.

Raby Noble‡ mentions one 10 feet 1 inch in length (identified by Mr. Phipson) making an unprovoked assault on a cooly woman in Assam, seizing her by the leg, and maintaining its hold for at least 8 minutes, when it was beaten off. She was treated by a "Doctor Babu" (treatment not specified), but succumbed in about 20 minutes. The symptoms were local pain and swelling, vomiting, laboured breathing and prostration. Theobald§ records, on the information of a Burman, an elephant being bitten on the trunk by a hamadryad whilst browsing on some foliage, with the result that death ensued in about 3 hours. Rogers¶ estimates that the virulence of the poison is very little inferior to that of the binocellate cobra.

Dimensions.—The largest record I am aware of is that reported by Phipson.‖ The snake which was captured in the Konkan measuredt 15 feet 5 inches. Another of exactly similar length was reported in the "Pioneer" September 4th, 1896 from Travancore by Lieut V. H. Branson, 28th Madras Infantry.

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* Cat. Rept. Brit. Burma, 1868, p. 61. † Bombay Nat. Hist. Jourl., Vol. XIV., p. 413.
‡ Bom. Nat. Hist. Jourl., Vol. XV., p. 358. § Cat. Rept. Brit. Burma, 1868, p 61.
¶ The *Lancet*, Feb. 6th, 1904, p. 349. ‖ Bombay Nat. Hist. Jourl., Vol. II., p. 245.

Colour.—Young are jet black with white or yellow conspicuous cross bars or chevrons on the body and tail. The head is crossed by 4 similar bars, usually complete, sometimes interrupted.

Adults vary a good deal. They may be yellow, olive-green, olive-brown, blackish-brown, or black, usually with more or less distinct yellowish or whitish cross bars or chevrons on the body, which are narrower than the intervals. Light specimens are often more or less variegated with black in the hinder part of the body and tail. Often, too, the shields on the head and scales on the neck are bordered with black. The belly may be nearly uniform, mottled, or barred, but the throat is usually uniformly light-yellowish or cream coloured.

CALLOPHIS BIBRONI—Bibron's Coral Snake.

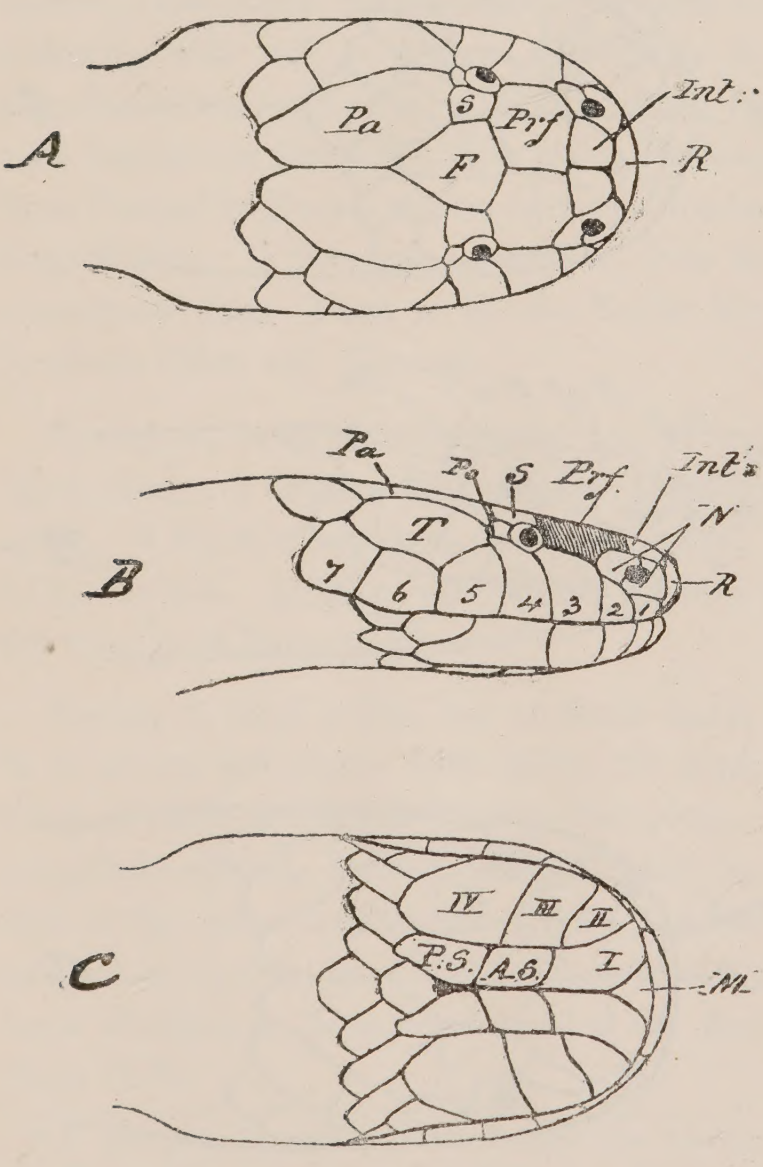

FIG. 19.—Callophis bibroni (× 3).

Identification.—It may be told from all others of this group by the fact that the præfrontal shield touches the 3rd supralabial (Prf. and 3, fig. 19 B.)

Supplementary characters.—*Præfrontals* touch the internasal, posterior nasal, 3rd supralabial, eye, supraocular and frontal. *Temporal* 1 touching the 5th, 6th and 7th supralabials (and sometimes the 4th also). *Supralabials* 7. *Anterior sublinguals* touch the 1st, the 3rd and the 4th infralabials. *Posterior sublinguals* touch the 4th infralabial. *Infralabials.*—The 4th is the largest of the series, and

touches 3 scales behind. *Scales* are 13 in whole body. *Anal* entire. *Subcaudals* divided throughout.

Distribution.—A rare species recorded only from the Western Ghats of India.

Poison.—Nothing known.

Dimensions.—Grows to 2 feet and over.

Colour.—Boulenger says *: "Cherry-red to dark purplish brown above, red beneath, with black transverse bands which are sometimes continuous across the belly; anterior part of head black above."

CALLOPHIS MACCLELLANDI—Macclelland's Coral Snake.

Identification.—From others of the group it can be distinguished by the following 3 characters co-existing:—The anal shield divided (as in fig. 9 E); supralabials 7; and a single temporal touching only the 5th and 6th supralabials. (*See* fig. 20 B.)

Supplementary characters.—*Præfrontals* touch the internasal, posterior nasal, præocular, supraocular, frontal. *Temporal* 1 touching the 5th and 6th supralabials. *Supralabials* 7. *Anterior sublinguals* touch 4 infralabials.

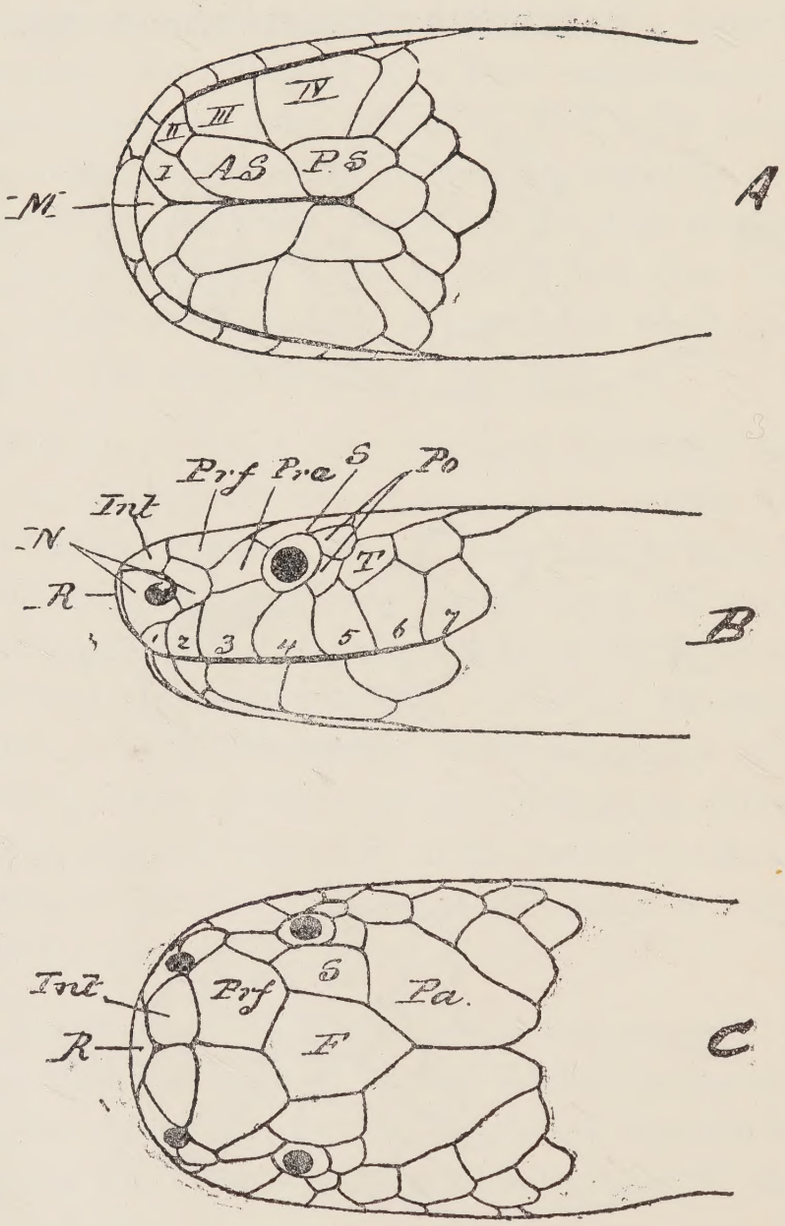

FIG. 20.—Callophis macclellandi (×3).

* Cat. Snakes, Brit. Mus., Vol. III, p. 399.

Posterior sublinguals touch the 4th infralabial only. *Infralabials.*—The 4th is the largest of the series, and touches 2 scales behind. *Scales* 13 in whole body. *Anal* divided. *Subcaudals* divided throughout.

Distribution.—Ranges from the Himalayas (Kasauli,* Nepal and Sikkim) through Assam, and Burmah to Southern China and Formosa. Common in the Khasi Hills about Shillong.

Poison.—Nothing known.

Dimensions.—My largest specimen is 2 feet 7½ inches.

Colour.—There are three very distinct colour varieties.

Variety A, forma typica.—Cherry-red above with from 16 to 26 black bands on the body and 3 to 4 on the tail. These bands are narrow, completely surround the belly and are outlined more or less distinctly with buff or yellow. The belly is sulphur yellow. and a large black irregularly-shaped blotch occurs between each band. It is very common in the Khasi Hills about Shillong. It has been recorded from Burma by Evans and myself who obtained a specimen from the Pegu Yomas. I have had a specimen from Mogok, Ruby mines, and a specimen from Pegu is in the British Museum. It extends into Southern China and Formosa.

Variety B, univirgatus.—Cherry-red, or brown with 23 to 32 black bands, many of which are incomplete especially in midbody over the spine. A black streak runs down the spine. Otherwise this variety is like the last. It is known from the Eastern Himalayas. (Nepal and the vicinity of Darjeeling.)

Variety C, gorei.—This has no black bands and no vertebral stripe. It is cherry-red above with about 30 small, black, vertebral spots. Some of these are rather broader than long. Belly pale yellow with irregularly-shaped, median, black ventral spots. smaller than those seen in the other two forms. I received lately two specimens of this new colour variety from Mr. C. Gore whose name I attach to it. Both were obtained at Jeypore (Assam) at the foot of an outlier from the Naga Hills.

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* A specimen I have just seen from this locality is the first recorded from the Western Himalayas. It also constitutes a distinct colour variety for which I propose the name *nigriventer*. It differs from *univirgatus* in having no trace of black rings, and in having a broad black continuous band along the middle of the belly.

In all three varieties the head is black with a very well defined, enamel white band across the head.

In variety *gorei* the black has a rather brown tinge.

CALLOPHIS TRIMACULATUS—The Slender Coral Snake.

Identification.—Differs from others of this group in combining the 2 following characters. The anal shield is divided (*see* fig. 9 E) and there are 6 supralabials.

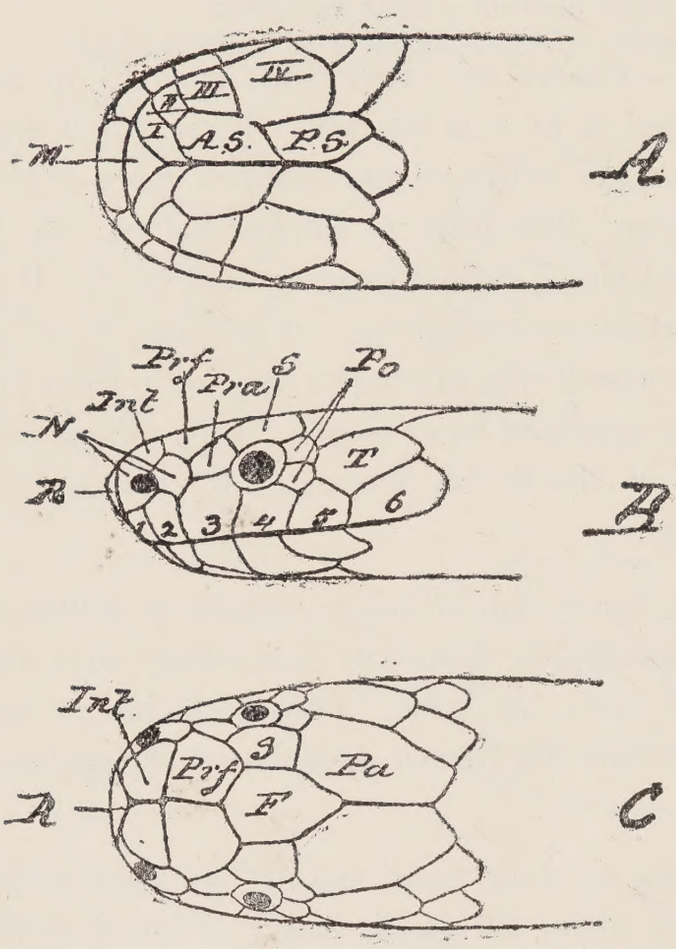

FIG. 21.—Callophis trimaculatus (× 6).

Supplementary characters.—*Præfrontals* touch the internasal, posterior nasal, præocular, supraocular, and frontal. *Temporal* 1, touching the 5th and 6th supralabials. *Supralabials* 6. *Anterior sublinguals* touch 4 infralabials. *Posterior sublinguals* touch the 4th infralabial. *Infralabials.*—The 4th is the largest of the series, and touches 2 scales behind. *Scales* in 13 rows in whole body. *Anal* divided. *Subcaudals* divided throughout.

Distribution.—An uncommon snake recorded from Ceylon *, S. India, Deccan, Kanara, Bengal, and Burmah.

Poison.—Nothing known.

Dimensions.—Of very slender form. Grows to 13 inches.

Colour.—Light yellowish-brown. Head and neck black. Tail with two black rings. Belly coral pink.

* I examined one in the Colombo Museum from Tissamaharana 20 miles N. E. of Hambantota.

CALLOPHIS MACULICEPS—The Small-spotted Coral Snake.

Identification.—This and the next differ from others of this group in having the anal shield divided (as in fig. 9 E) and the temporal shield touching the 5th, 6th and 7th supralabials. The habitat will separate one from the other.

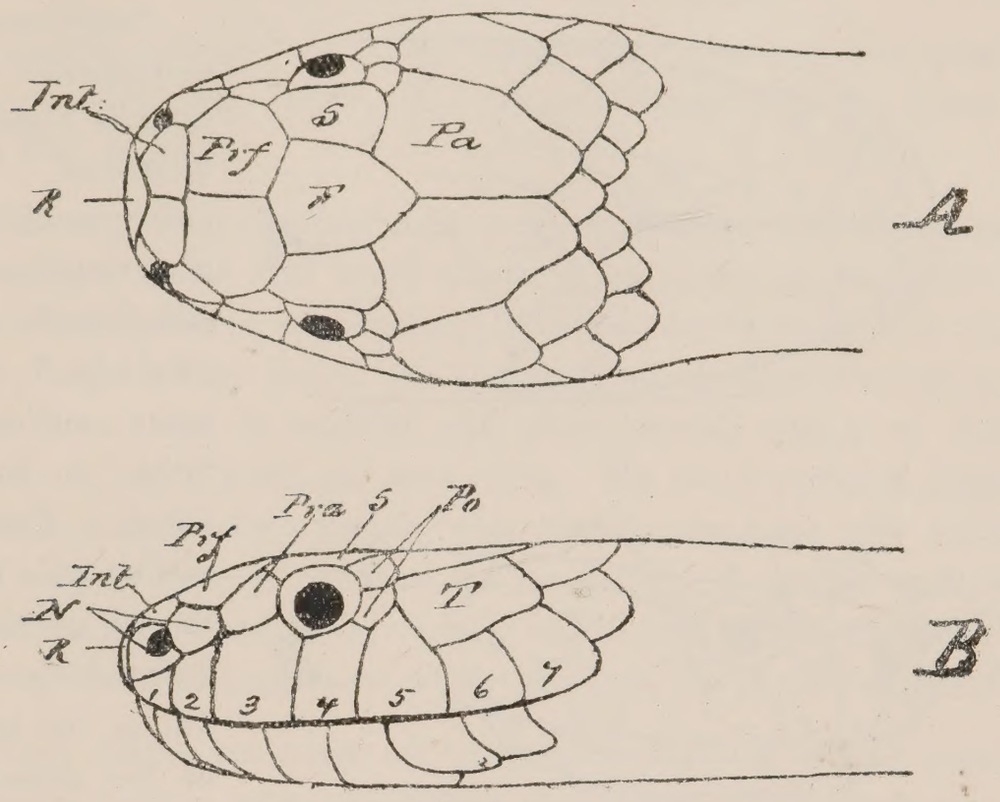

FIG. 22.—Callophis maculiceps (× 6).

Supplementary characters.—*Præfrontals* touch the internasal, posterior nasal, præocular, supraocular, and frontal. *Temporal*—One; touching the 5th, 6th and 7th supralabials. *Supralabials* 7. *Anterior sublinguals* touch 4 infralabials. *Posterior sublinguals* touch the 4th infralabial. *Infralabials.*—The 5th, rarely 4th, is the largest of the series, and touches 2 scales behind. *Scales* 13 in whole body. *Anal* divided. *Subcaudals* divided throughout.

Distribution.—An uncommon snake restricted to the Burmese area of our British-Indian Territory.

Poison.—Nothing known.

Dimensions.—Grows to 1½ feet.

Colour.—Head and neck black. Body yellowish-brown above, with a series of small black dots on each side of the spine. Two black bands on the tail—one basal, the other subterminal. Belly coral pink. Tail dappled black, and grey beneath.

HEMIBUNGARUS NIGRESCENS—The Common Indian Coral Snake.

Identification.—Like the last this differs from others of this group, in that the anal shield is divided, and the temporal touches the 5th, 6th and 7th supralabials. Its habitat will distinguish it.

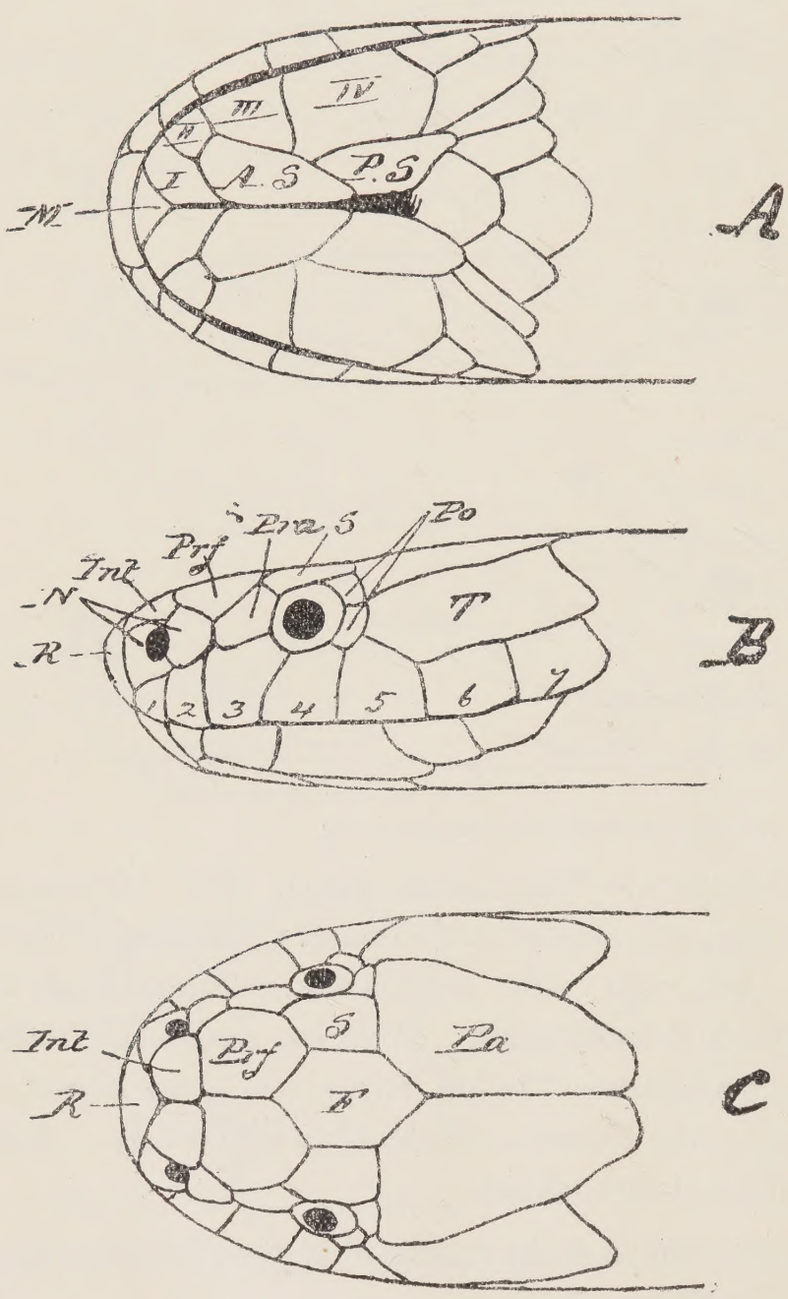

FIG. 23.—Hemibungarus nigrescens (× 3).

Supplementary characters.—*Præfrontals* touch the internasal, posterior nasal, præocular, supraocular, and frontal. *Supralabials* 7. *Anterior sublinguals* touch 4 infralabials. *Posterior sublinguals* touch the 4th infralabial. *Infralabials.*—The 4th is the largest of the series, and touches 2 scales behind. *Scales* in 13 rows in whole of body. *Anal* divided. *Subcaudals* divided throughout.

Distribution.—It is a hill species confined to the Hills of Western India, from Wynad to Travancore including the Nilgiris and Anamallays. Also from the Ganjam Hills.

Poison.—Nothing known.

Dimensions.—It grows to 4 feet.

Colour.—Head and neck black except for a yellowish oblique occipital streak. Dorsally purplish-brown, reddish-brown, or red, with 3 or 5 longitudinal series of spots which in some specimens are confluent, and form lines. Belly uniform red.

GROUP 4.—THE PIT-VIPERS.

Identification.—(1) *Tail round.* (2) *A conspicuous opening in the side of the face between the eye and the nostril* (*the loreal pit*) (*see* Fig. 24 B).

This very distinctive character is peculiar to this subfamily of vipers. In spite of the fact that many members of this subfamily (Crotalinæ) attain formidable proportions, and almost all are endowed with remarkably large poison fangs, the numerous accounts of bites inflicted by them to be found in scientific and other journals concur in showing that death is an exceedingly rare event. My own experience, supported by that of many of my friends, who have favoured me with letters on this subject, entirely confirms the foregoing. A painful and swollen condition locally and a very variable degree of constitutional disturbance lasting in some instances for weeks passes on to complete recovery.

These snakes are nearly all exclusively confined to hilly regions at altitudes ranging between 1,500 to 10,000 feet. The characters of the shields, and scales upon which the classification of nearly allied ophidian forms is so largely based, are subject to very great inconstancy in the members of this group, so much so that it is with the greatest difficulty one can frame a lucid and really practical key to identify the various species. I have, however, examined and re-examined most critically all the specimens in the British Museum, and have only made allusion to those peculiarities which are most constant, and which seem to me of real practical use in identification.

Key for indentification of Pit-Vipers.

HEAD WITH LARGE SHIELDS (*see* Figs. 24 to 27).

Scales midbody in 21 or 23 rows (*see* Fig. 7) ... *Ancistrodon himalayanus.*

Scales midbody in 17 rows ..... „ „

(*a*) Supraocular as broad as frontal, longer than parietals..... *Ancistrodon hypnale.*

(*b*) Supraocular broader than frontal, shorter than parietals..... „ *millardi.*

Scales midbody in 15 or 14 rows..... *Lachesis macrolepis.*

HEAD COVERED WITH SMALL SCALES (*see* Fig. 28).
UPRAOCULARS UNDIVIDED (*see* S, Fig. 26).
2ND SUPRALABIAL DISTINCT FROM LOREAL PIT (*see* Fig. 28)..... .... *Lachesis strigatus.*
2ND SUPRALABIAL WITH A FURROW IN ITS UPPER PART DIRECTED INTO LOREAL PIT (*see* Fig. 27).
MANY SMALL SUBOCULAR SCALES (*see* Fig. 29)..... .... „ *monticola.*
AN ELONGATE SUBOCULAR SHIELD (*see* So, Fig. 26).
SCALES 21 *or* 19 *IN POSTERIOR BODY* (*see* Fig. 7).
Nasal and 1st supralabial partially or completely united (*see* Fig. 30).
Scales in midbody 29 *rows* (*see* Fig. 7)..... „ *cantoris.*
„ „ „ 27 *to* 23 *rows.* „ *purpureomaculatus.*
Nasal and 1st supralabial distinct (*see* Fig. 33) ..... „ *mucrosquamatus.*
SCALES 17 *OR* 15 *IN POSTERIOR BODY* (*see* Fig. 7.)
Supralabials 7 or 8 (*see* Fig. 33) „ *jerdoni.*
„ 9 to 12 (*see* Fig. 34) „ *gramineus.*
SUPRAOCULARS DIVIDED (*see* S, Fig. 35.)
Subocular touching 3rd supralabial (*see* So, Fig. 35) ... „ *trigonocephalus.*
„ not „ „ „ (*see* So, Fig. 36) ..... „ *anamallensis.*

ANCISTRODON HIMALAYANUS—The Common Himalayan Viper.

Identification.—The top of the head has the shields in front enlarged, and the scales in the middle of the body are arranged in 21 to 23 rows. These combined characters will distinguish this from the other pit-vipers, and even if the head is badly mutilated short of dissolution, I think the enlarged head shields will be generally clearly recognized.

Distribution.—It is confined to the Himalayan region, including the Khasi Hills of Assam, at altitudes between 5,000 to 10,000 feet, and is exceedingly common in some localities (Lidda Valley, Kashmir).

Poison.—In spite of its abundance I only know one authentic record of a bite inflicted by this species. A collector of Mr. P. W. Mackinnon's was wounded in trying to capture one near Mussoorie.

It struck at him, and scratched his thumb, but no ill-effects, local or constitutional, supervened.

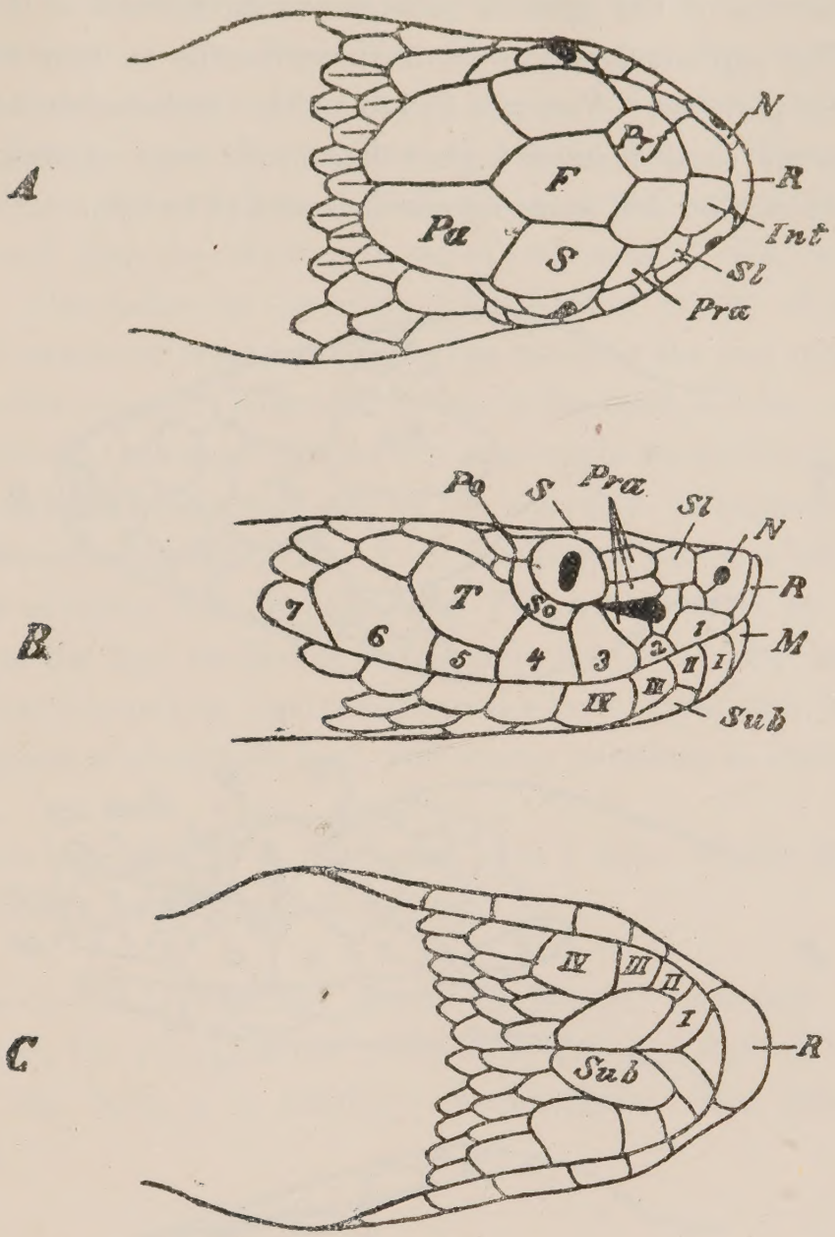

FIG. 24.—Ancistrodon himalayanus (× 2).

Dimensions.—Boulenger gives 2 feet 10 inches. Its usual adult length is about 2 feet.

Colour.—Brown of various hues, sometimes nearly uniform, especially in light specimens, but more often mottled or variegated so as to form bars, or a nondescript carpet-like pattern. Belly peppered blackish and red, on a whitish ground.

ANCISTRODON HYPNALE—The Hump-nosed Viper.

Identification.—Like the last this species has large shields on the front of the head, but differs in the scales, numbering 17, in the middle

of the body, and both these characters will usually be detected even in a badly mutilated specimen. The frontal shield along a line connecting the centres of the eyes is subequal to the breadth of the supraoculars. The supraoculars are from three-fourths to four-fifths the length of the parietals. Ventrals 116 to 131. Subcaudals 24 to 37. The boss on the snout is much higher than in the next species, and is covered with smaller and more numerous scales (8 to 12).

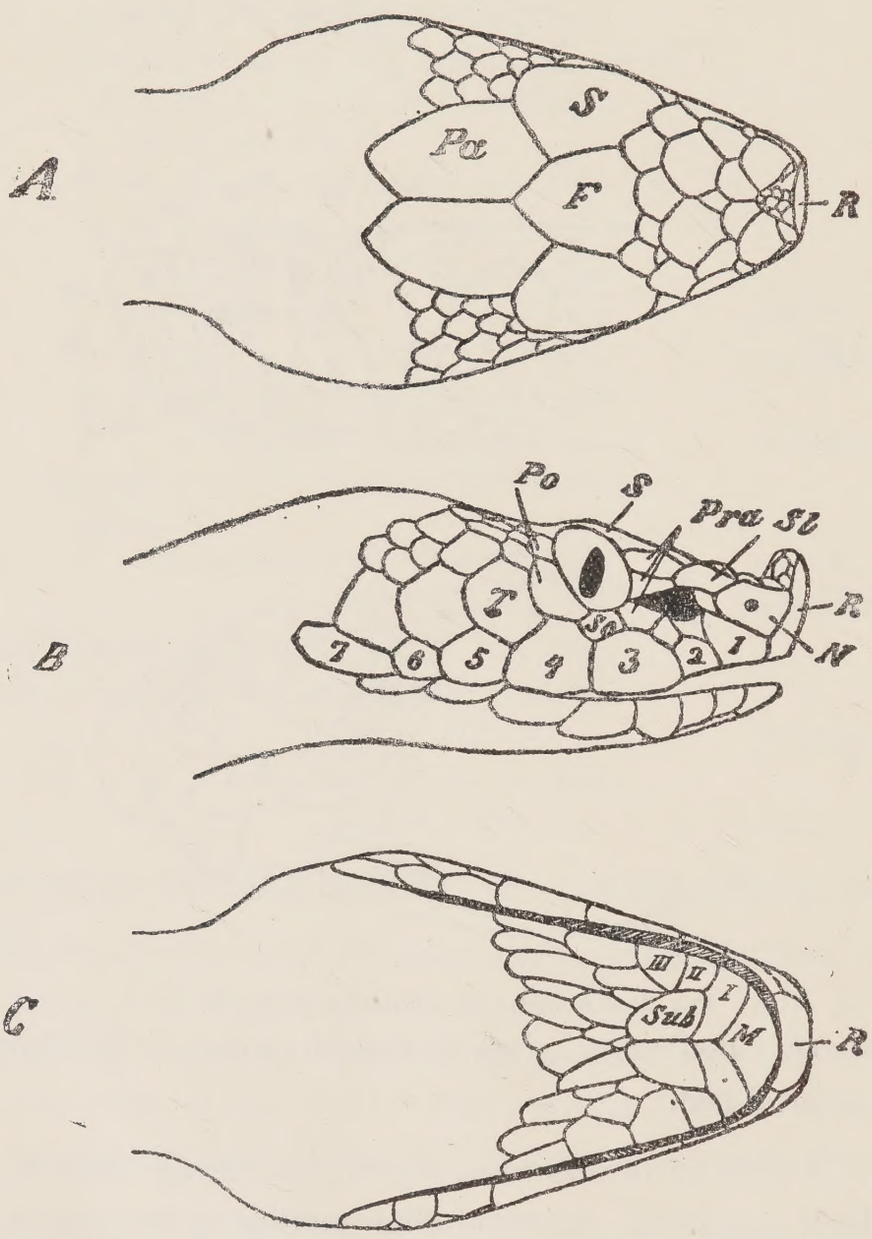

FIG. 25.—Ancistrodon hypnale (× 3).

Distribution.—The Hills of Ceylon. It occurs at altitudes varying from 3,000 to 6,000 feet and is not uncommon in many parts. It is a very common snake in some of the hilly districts in Ceylon (Hakgalla).

Poison.—Writers are not consistent upon this question. Tennent* says emphatically that a fatal issue does sometimes occur, but not invariably. Gunther† says it is exceptionally fatal to man, and then not before the lapse of some days. Dr. Davy knew a dog bitten by one recover after severe symptoms in 48 hours, but a fowl bitten by the same snake the next day succumbed after 4 days. These effects on small animals serve to show that the poison is not very virulent. Mr. Drummond Hay has written to me of two cases of bite, both in cooly women. One bitten on the ankle did not suffer in the slightest once she had recovered from her fright, but whether she was treated or not I am unable to say. The other bitten in the hand became unconscious and he thought when he saw her the same night would die, but with the aid of stimulants had recovered by the next day. Ferguson‡ mentions the self-related facts of a Mr. A. F. Sanderson who was bitten by one. The seat of injury was the little toe. Pain was so acute as to prevent sleep, and the limb swelled to the knee for 2 or 3 days, but he recovered He treated himself by ligature above the knee, cross cuts locally with the application of carbolic acid, and strong potations of brandy.

Dimensions—Grows to 18 inches, but I have known females adult at 11½ inches, as shown by pregnancy.

Colour.—The prevailing colour is brown, variously mottled or variegated, but a longitudinal series of largish oval dark spots on each side of the back is a constant characteristic. The belly is finely mottled.

ANCISTRODON MILLARDI§—Millard's Viper.

Identification.—Shields on the top of the head enlarged, scales at midbody 17, supraoculars decidedly broader than the frontal, and as long or longer than the parietals. Ventrals 136 to 152. Subcaudals 30 to 44. The boss on the snout is not so pronounced as in the last, and is covered with larger and fewer scales (4 to 6).

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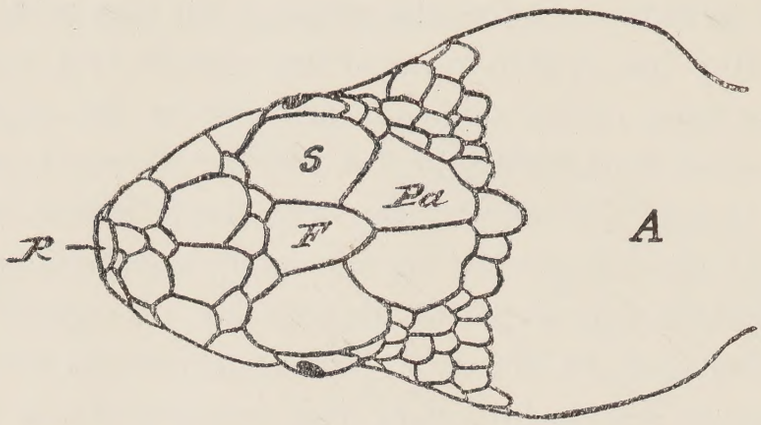
* Nat. Hist of Ceylon, p. 296.

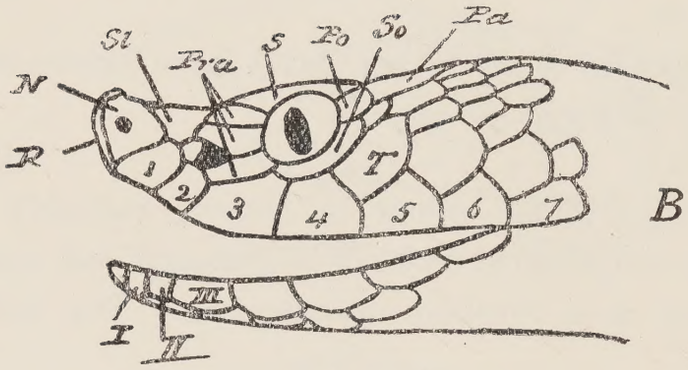
† Rept. Brit. Ind., p. 395.

‡ Bom Nat. Hist. Journ., Vol. X., p. 9.

§ Described in the Bom. Nat. Hist. Journal, Vol. XVIII, page 792.

Distribution.—The 5 specimens I have seen are from Carwar on the West Coast and Castle Rock on the top of the Western Ghats. Specimens in the British Museum from Ceylon and the Hills of Western India (Belgaum and Anamallays), judging from the numbers of the ventrals and subcaudals, appear to agree.





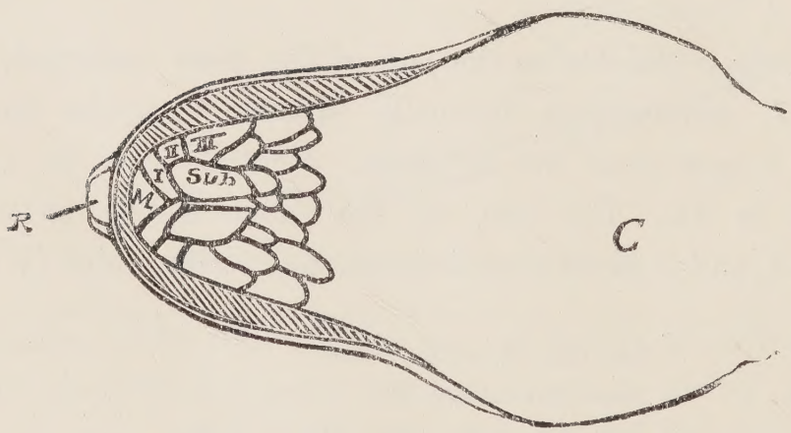


FIG. 26. Ancistrodon millardi (×3).

Poison.—Nothing known.

Dimensions.—About a foot or a little over.

Colour.—Brown of varying shades and mottlings. A series of ovate dark costal spots are always more or less in evidence. Very like *hypnale* in general appearance.

LACHESIS MACROLEPIS—The Large-scaled Viper.

Identification.—One very distinctive feature makes the recognition of this snake a very simple matter. The scales of the last row along the body are smaller than any of the other rows. In all other British Indian snakes the scales in this row are subequal to, or much larger than, those lying above.

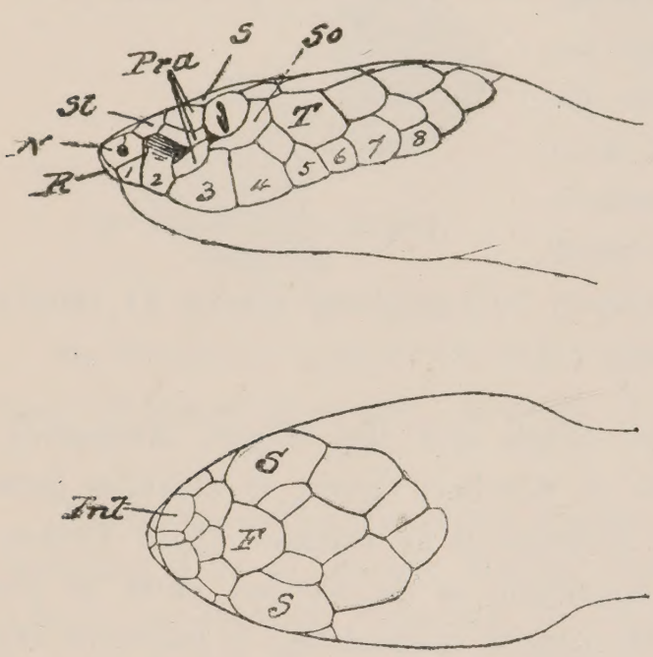


FIG. 27.—Lachesis macrolepis (nat. size).

Distribution.—Confined to the Pulney, Shevaroy, and Anamallay Hills of Southern India, where it is plentiful at altitudes varying from 2,000 to 7,000 feet.

Poison—Jerdon* knew several cases of bite from this species, but none proved fatal. The Rev. F. Castels has informed me that he once caused a fresh adult to bite a jackal, but the jackal did not seem to mind, and suffered no ill-effects.

Dimensions.—Grows to 2 feet.

Colour.—Uniform bright foliage-green above, lighter beneath. A well-defined white or yellow line runs down the flanks. Sometimes a blackish supercilium, blackish marks along the spine, and blackish rings round the tail, but these rapidly fade in spirit. Rarely specimens are met with uniform olive-brown in colour.

* Journal Asiatic Soc., Bengal, Vol. XXII., p. 524.

LACHESIS STRIGATUS—The Horse-shoe Viper.

Identification.—This is the only species in which the 2nd labial shield is entirely distinct from the loreal pit (*see* Fig. 27), and this alone will suffice to establish its identity.

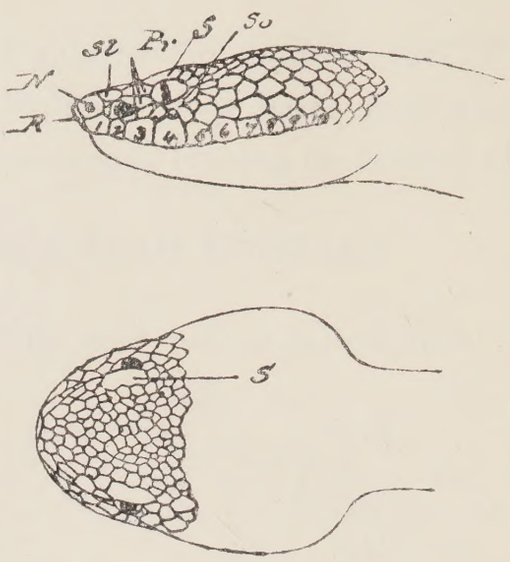


FIG. 28.—Lachesis strigatus (nat. size).

Supplementary characters.—*Internasals.*—No scales are sufficiently enlarged to deserve the name. *Supraocular*—A single shield.

Nasal.—Not united to 1st labial one or more minute scales are intercalated between it and the furrowed shield forming the inner wall of the loreal pit. *Subocular*—Not touching the 3rd labial. *Scales.*—Anterior usually 21 (rarely 19); midbody usually 21 (rarely 23); posterior usually 15 (rarely 17).

Distribution.—The Western Ghats and the Nilgiri, Anamallay, Shevaroy, and Pulney Hills of Southern India, at altitudes from 3,000 to 8,000 feet. Gray mentions it as common about Ootacamund, and Jerdon as not uncommon in the wooded parts of the Nilgiris; but, judging from the paucity of specimens in museums, and the written testimony of friends, it appears to me an uncommon snake everywhere.

Poison.—Jerdon* mentions being bitten by one. A ligature speedily applied, followed by suction, warded off any ill-effects, but the skin round the bite blackened in a minute or two, detached itself, and came off in his mouth during suction.

Dimensions.—Grows to 1½ feet.

Colour.—The prevailing colour is brown, mottled darker to form an irregular coarse variegation. A pale buff or yellowish horse-shoe mark on the nape. A dark streak behind the eye. Beneath light-coloured mottled with darker hues.

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* Journal Asiatic Soc., Bengal, Vol. XXII., p. 525.

LACHESIS MONTICOLA—The Large-spotted Viper.

Identification.—This is the only species that has no subocular shield, and this character will serve to diagnose it.

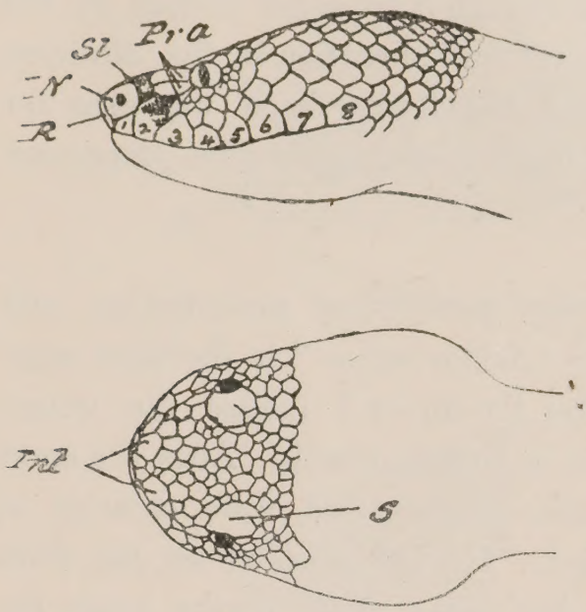

FIG. 29.—Lachesis monticola (nat. size).

Supplementary characters.—*Internasals.*—A pair, separated by from 1 to 3 small scales. *Supraocular.*—A single shield. *Nasal.*—Not united with 1st labial; no minute scales intercalated between it and the 2nd labial. *Subocular* absent; *2nd labial* furrowed in its upper half, and forming the inner wall of the loreal pit. *Scales.*—Anterior usually 23 (rarely 25); mid-body 23 (rarely 21 or 25); posterior 19 (rarely 21).

Distribution.—The Himalayan region (from 2,000 to 8,000 feet) including Hills of Assam, Burmah and Yunnan. Colonel Waddell, I.M.S., in his book "Among the Himalayas" (p. 240) mentions it as common in Bhotan. I found it common in the Khasi Hills (Shillong).

Poison.—Stoliczka* mentions a cooly who was bitten by a small one about 14¼ inches in length. He made him suck vigorously, and gave him brandy, and no ill-effects were noticed. Though bitten he was probably not poisoned. A snake-catcher of mine was bitten by one which measured 1 foot 9 inches. The wound was inflicted on the dorsal aspect of the second phalanx of his right middle finger. I saw him two hours after the accident. He was complaining of much pain, the wound was still oozing, and there was much swelling of the hand, forearm, and arm, extending even to the loose tissues below the axilla. He recovered without any constitutional symptoms, nervous or otherwise, excepting a serious hæmorrhage which occurred the day afterwards. This began from the wound while he was asleep at mid-day, and when

* Journal Asiatic Soc., Bengal, Vol. XXXIX, p. 224.

I saw him some 20 minutes later he had bled fully a pint and-a-half, and was still bleeding profusely. He never had a temperature above 99° in spite of the severe local effects. The entire virulence of the poison seemed to have been spent on altering the constitution of the blood. It was specially noted that, though it appeared normal to the naked eye, it did not clot, and the profound alteration in the direction of reduced coagulability which caused the hæmorrhage was seen for four days at least when the wound began oozing again after suspension of internal remedies.

His treatment consisted of a very perfunctory cauterisation and ineffectual ligature carried out by a "doctor baboo" in the bazar some time after the bite. Two hours after the injury I incised the wound freely, and rubbed in permanganate of potash crystals. After the onset of hæmorrhage, the internal remedies administered were chloride of calcium, adrenalin chloride and ergot. He left hospital on the third day after the hæmorrhage, but had some slight oozing again the next day.

Another cooly in Shillong brought me two of these snakes, and said he had just been bitten by one. They were both adults. His right ankle had been scratched by the fang, and the tissues were a little swollen. He complained of no pain, and betrayed no fear, and I saw him four days later, when he told me he was quite well, and had not suffered much. He had applied ginger locally.

Dimensions.—Grows to 3 feet.

Colour.—Light brown or buff with large irregularly squarish patches or spots of black on the middle of the back, and a coarse mottling of these two hues in the flanks. Crown dark brown with a buff V bordered dark brown below. Belly yellowish, uniform in front, obscurely spotted or mottled behind.

LACHESIS CANTORIS—Cantor's Viper.

Identification.—Most easily identified by the rows of scales in the middle of the body numbering 29.

Supplementary characters.—*Internasals.*—A pair separated by one small scale. *Supraocular.*—A single shield. *Nasal* partially or completely united with 1st labial; no minute scales intercalated between

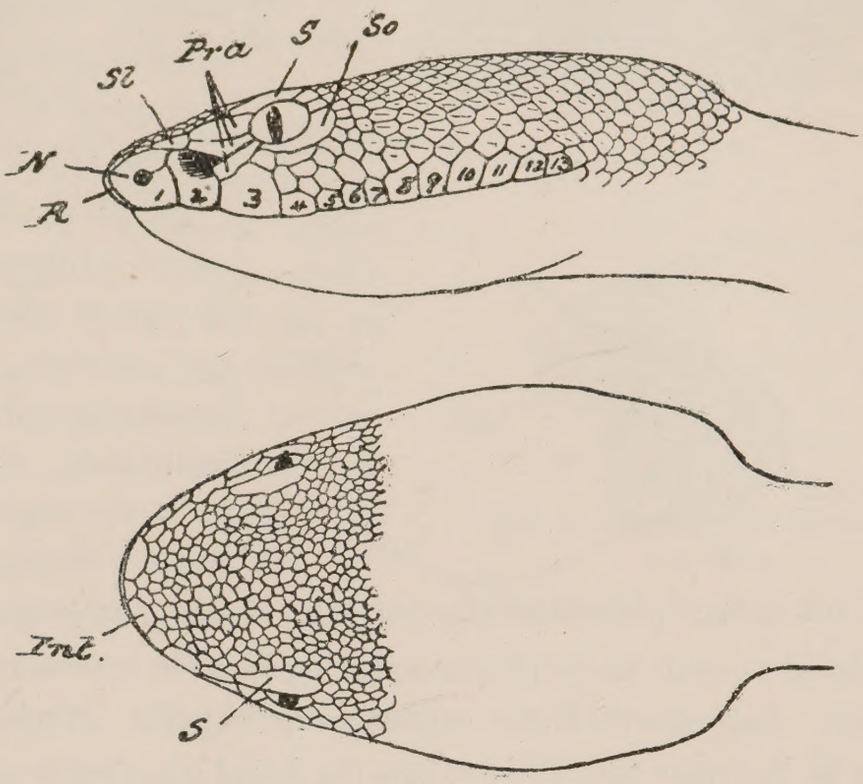

FIG. 30.—Lachesis cantoris (nat. size).
Note confluence of nasal (N) and 1st supralabial (1).

it and the 2nd labial. *Subocular* not touching the 3rd labial. *2nd labial* furrowed in its upper half, and forming the inner wall of the loreal pit. *Scales.*—Anterior, 27; midbody, 29; posterior, 21.

Distribution.—Peculiar to the Andaman and Nicobar Islands.

Poison.—Stoliczka remarks on the small size of the poison gland even in specimens 3 to 4 feet long, and both he and Dr. Rink who visited the insular groups above mentioned, where they found this snake extremely abundant, elicited information from the natives showing that they (the natives) did not regard the bite as fatal.

Colour.—There are two varieties, the one bright green or dull greenish with dark spots, often arranged alternately in five longitudinal series; the other light, or dark brown, spotted with pale greenish. Usually a well-defined white line runs along the flanks, and the head has frequently a pale lateral streak. Belly whitish or greenish, uniform or mottled.

LACHESIS PURPUREOMACULATUS—Gray's Viper.*

Identification.—The nasal shield more or less united with the 1st labial, and the scales in the posterior part of the body numbering 19, when taken together will distinguish this from all the rest of the group.

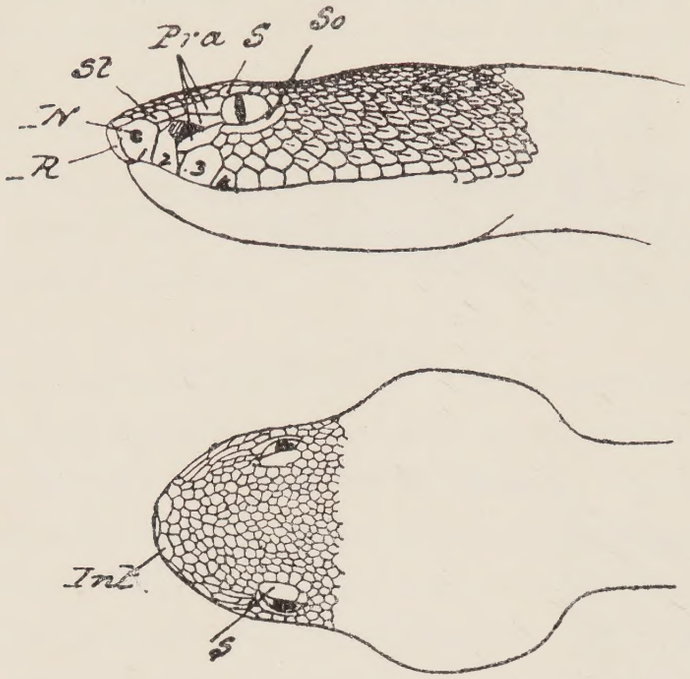

FIG. 31.—Lachesis purpureomaculatus (nat. size).

Supplementary characters.—Internasals.—A pair in contact with one another, or more usually separated by one small scale. *Supraocular.*—A single shield. *Nasal.*—Partially or completely united with the 1st labial; one or more minute scales intercalated between it and the 2nd labial. *Subocular.*—Not in contact with 3rd labial. *2nd labial* with a furrow in its upper part directed into the loreal pit. *Scales*—Anterior, 23 to 25; midbody usually 25 (rarely 23 or 27); posterior, 19.

Distribution.—Bengal, the Himalayas from probably the Sutlej in the West, Assam, and Burmah, Andamans, and Nicobars. In India it is not met with in the plains, but in Burmah occurs in hills and plains alike. Has been and is frequently confused with *L. gramineus.*

Poison.—Stoliczka's observations with regard to the opinion of the natives in the Andamans and Nicobars show that it is not regarded as fatal to man.

Dimensions.—Grows to 4 feet.

Colour.—Three varieties are met with: (A) uniform foliage green; (B) uniform purplish-brown, or purplish-black; (C) variegated, purplish-brown and green. Usually a well-defined white or yellow flank line. Beneath uniform greenish or whitish with sometimes obscure mottling.

* As it is convenient to give English names to snakes, and Gray was the first to describe this viper, I take the liberty of calling it by his name. It is meet, too, that the work of our great herpetologists should be thus memorialised.

LACHESIS MUCROSQUAMATUS—The Formosan Viper.

Identification.—The scales in the posterior part of the body number 21 or 19, the nasal not united to the 1st labial, and the presence of a subocular establish the diagnosis, but all three characters must co-exist.

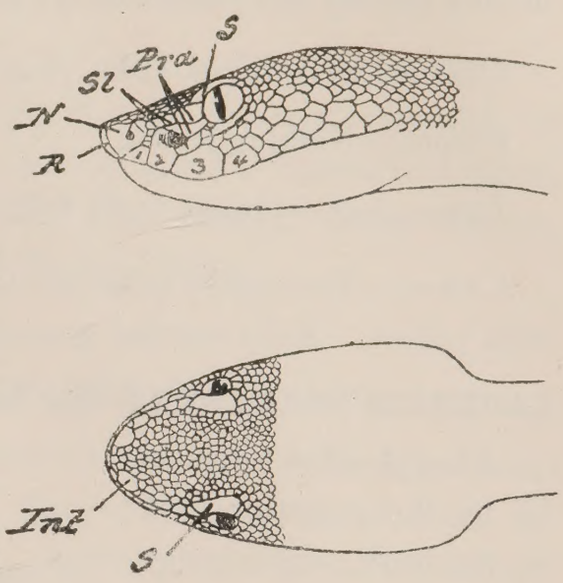

FIG. 32.—Lachesis mucrosquamatus (nat. size).

Supplementary characters. Internasals.—A pair separated by from 2 to 4 small scales. *Supraocular*—A single shield. *Nasal*—Not united with the 1st labial, one or more minute scales intercalated between it and the 2nd labial. *Subocular* not touching the 3rd labial. *2nd labial* with a furrow in its upper part directed into the loreal pit. *Scales*—Anterior, 25 to 27; midbody, 23 to 27; posterior, 19 to 21.

Distribution.—Naga Hills, Assam; also Formosa.

Poison.—Nothing known.

Dimensions.—Grows to 3½ feet.

Colour.—Brownish with 3 longitudinal series of blackish spots, the vertebral series being the largest. Belly mottled brownish and white, or uniform whitish.

LACHESIS JERDONI—Jerdon's Viper.

Identification.—The subocular touching the 3rd labial together with 7 to 8 supralabials make diagnosis certain.

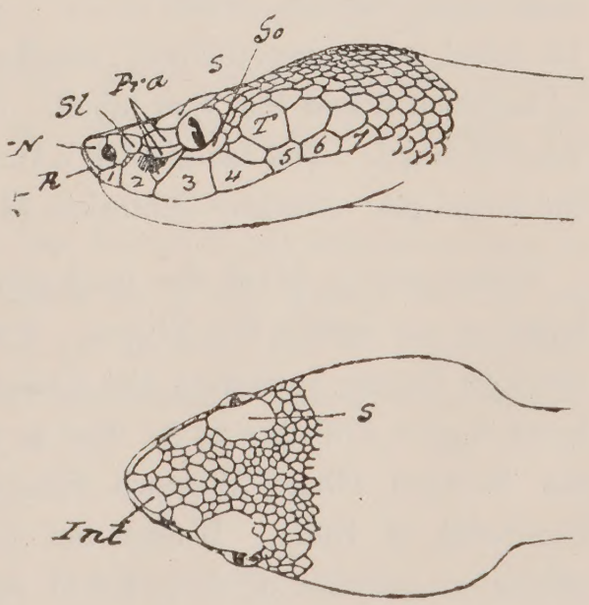

FIG. 33.—Lachesis jerdoni (nat. size).

Supplementary characters. Internasals.—A pair, separated by from 1 to 3 small scales. *Supraocular*—A single shield preceded by an enlarged shield peculiar to this species. *Nasal* not united with 1st labial; small scales may or may not be intercalated between it and the

2nd labial. *Subocular* touches the 3rd labial. *2nd labial* with a furrow in its upper part directed into the loreal pit. *Scales.*—Anterior 21, usually (rarely 23) ; midbody 21 (rarely 19) ; posterior 17 (rarely 15).

Distribution.—Khasi Hills, Assam, Thibet.

Poison.—Nothing kown.

Dimensions.—Grows to 2½ feet.

Colour.—Variegated greenish and black. Head black, ornamented with yellow. Belly mottled greenish and black.

LACHESIS GRAMINEUS—The Common Green Viper or Bamboo Snake.

Identification.—Scales 15 in the posterior part of the body, supraocular a single shield, supralabials 9 to 12, the 2nd furrowed in its upper half, if co-existing will serve to identify it.

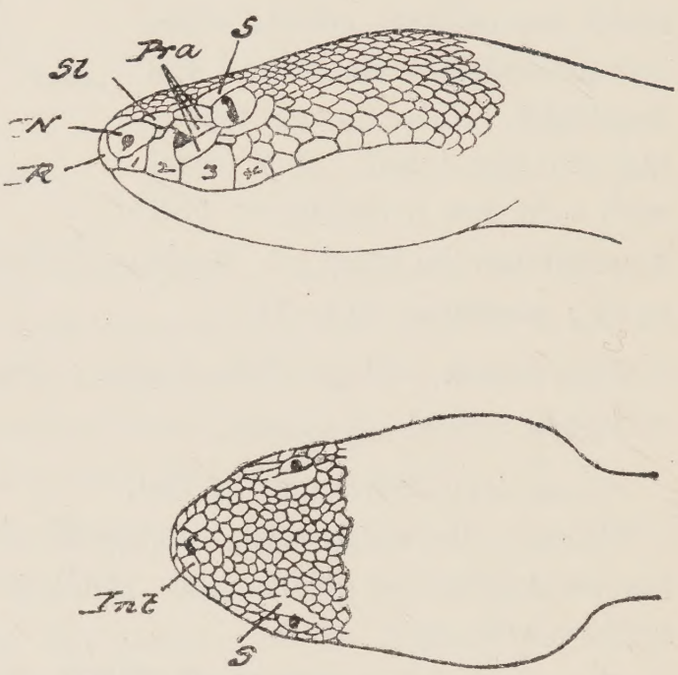

FIG. 34.—Lachesis gramineus (nat. size).
(Variety from Western Ghats.)

Supplementary characters.—Internasals.—A pair, in contact, or separated by one or two small scales. *Supraoculars*—A single shield. *Nasal*—Sometimes united with 1st labial, sometimes distinct ; small scales may or may not be intercalated between it and the 2nd labial. *Subocular* may or may not touch the 3rd labial. *2nd labial* with a furrow in its upper part directed into the loreal pit. *Scales.*—Anterior, 21 ; midbody, 21 ; posterior, 15.

Distribution.—Much the most plentiful and the most widely distributed of our Indian Pit-Vipers. From the Malayan region it extends through Burma, including the Andamans and Nicobars, to the Himalayan region probably as far west as the Sutlej River. It is found in the Eastern Ghats, Western Ghats, Nilgiris and other hills in the Peninsula of India. It does not occur in the plains of India, but affects an altitude of from 1,500 to 6,000 feet. East of Calcutta it occurs in the plains and hills alike.

Poison.—The bite is rarely if ever fatal, but severe local effects and constitutional disturbances are usually attendant. There is abundant evidence to substantiate this assertion, among Europeans and natives alike.

Dimensions.—Grows to 3½ feet.

Colours.—Usually vivid foliage-green. More rarely yellowish, or olivaceous or brown, sometimes obscurely streaked or barred with black. A well-defined white or yellow flank line usually. Belly whitish, plumbeous greenish, uniform or indistinctly mottled.

LACHESIS TRIGONOCEPHALUS—The Green Tic.

Identification.—The supraocular shield divided, and the subocular touching the 3rd labial, if found co-existing, serve to fix its identity.

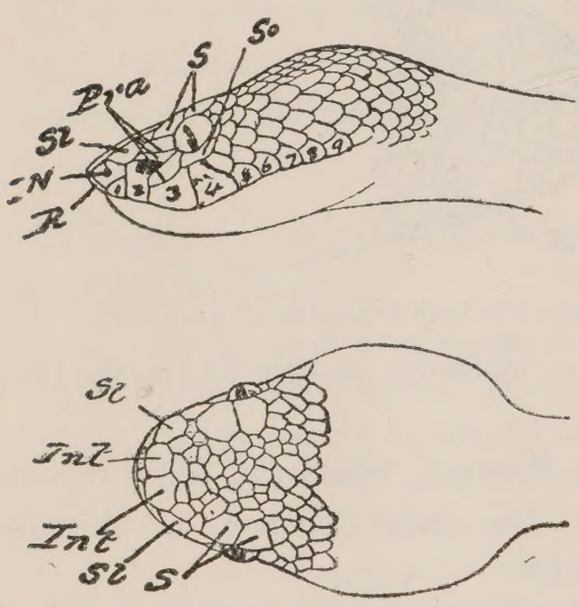

FIG. 35.—Lachesis trigonocephalus (nat. size).

Supplementary characters.—*Internasals.*—A pair in contact with one another. *Supraocular* divided. *Nasal* not united with 1st labial; no small scales intercalated between it and the 2nd labial. *Subocular* touches the 3rd labial. 2nd *labial* with a furrow in its upper part directed into the loreal pit. *Scales.*—Anterior, 17 or 19; midbody 17 or 19; posterior, 13 or 15.

Distribution.—Peculiar to Ceylon, where it is common in many parts of the hills. It is known to the planters as the Green Tic Polonga.

Poison.—Mr. Drummond Hay has informed me in a letter that he once had a Eurasian conductor bitten by a full grown one in his presence. The bitten hand swelled up at once, but by evening had much reduced, and the following day the swelling had almost entirely disappeared.

Dimensions.—Grows to 2½ feet.

Colour.—Foliage-green, uniform, or with black blotchings. A black streak behind the eye. Belly uniform greenish or yellowish.

LACHESIS ANAMALLENSIS—The Anamallay Viper.

Identification.—Supraocular divided, and co-existing with this, a subocular not touching the 3rd labial.

Supplementary characters.—*Internasals.*—A pair separated by a small scale. *Supraocular* divided. *Nasal* not united with 1st labial; small scales may or may not be intercalated between it and the 2nd labial. *Subocular.*—Not touching the 3rd labial. 2nd *labial*, with a furrow in its upper part directed into the loreal pit. *Scales.*—Anterior, 21; midbody, usually 21 (rarely 19); posterior, 15 or 17.

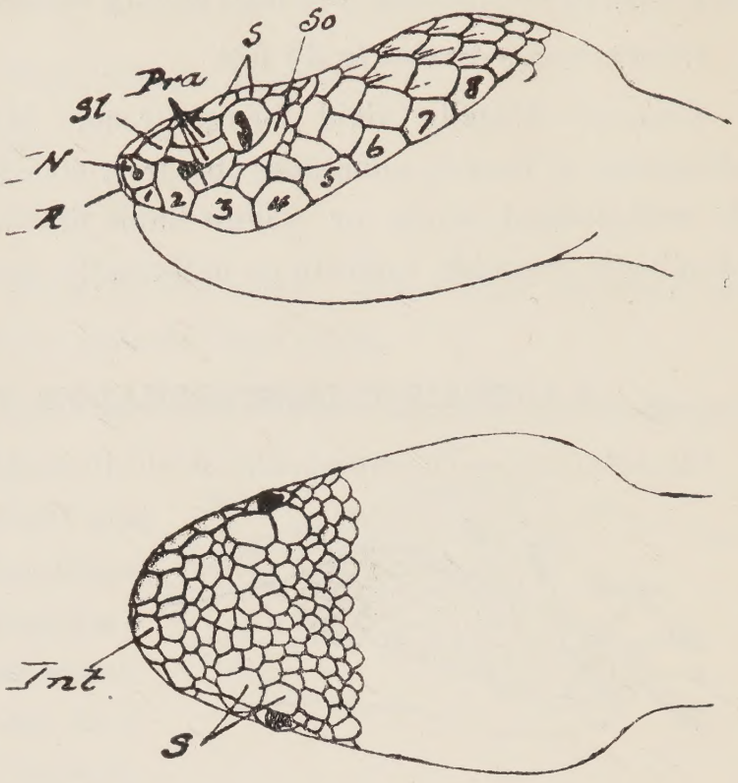

FIG. 36.—Lachesis anamallensis (nat. size).

Distribution.—Confined to the Western Ghats and hilly regions south of the Krishna River, where it is quite common, at altitudes ranging between 2,000 to 7,000 feet.*

Poison.—Jerdon† has known several cases of bite, but none proved fatal. Mr. Henderson has informed me by letter how he was once bitten by one in the forefinger. The snake was half grown. He sucked the wound, and cauterised it at once, and "suffered very little discomfort." For some time afterwards he experienced a sense of weight in this arm when it was held down. Ferguson‡ relates how Baron Von Rosenberg was bitten by this snake in the foot. He did not know he was bitten, and walked 10 miles before pain asserted itself. He then found the member so swollen he had to cut the boot off. After a night of pain and fever, a cupful of blood and matter came away, and it was several days before he could wear anything but a

* The specimen from Cuttack (No. 4122 in the Indian Museum, Sclater J. A. S. Bengal., Vol. LX) is in my opinion *L. gramineus*.

† Journal, Asiatic Society of Bengal, Vol. XXII., p. 525.

‡ Journal, Bombay Nat. Hist. Soc., Vol. X., p. 9.

slipper. A year later the place swelled up again, became painful, and discharged matter. Ferguson also mentions having met a hillman with a withered right arm which he (the native) attributed to a bite from this reptile.

Dimensions.—Grows to 3½ feet.

Colour.—Greenish variegated with blackish, or dark blackish-green. Boulenger says olive, yellowish or reddish-brown. Flanks coarsely dappled with buff. Belly greenish or yellowish.

GROUP 5—PITLESS VIPERS.

Identification.—*(1) Tail round. (2) Snout and crown coverea with small scales similar to those on the back of the body*; see fig. 37. (3) Only a part of the last row of costals is visible on either side of the ventrals when the specimen is laid on to its back (see fig. 5). (4) No loreal pit.*

This group includes 5 species referable to 4 genera. They may be identified as follows:—

A. Shields beneath tail similar to those beneath belly (*see* SC., Fig. 9 B)..... *Echis carinata.*

B. Shields beneath tail divided (*see* SC., Fig. 9 D)

(*a*) Ventrals with 2 ridges (*see* V, Fig. 37) ..... *Eristocophis mcmahoni.*

(*b*) Ventrals not ridged.

(a^1) No horn above eye.

3 chains of large spots, one along spine, and one on each side ... *Vipera russelli.*

1 chain of spots along spine, none on the sides ..... „ *lebetina.*

(b^1) A horn-like appendage above the eye. 4 chains of spots along body ..... *Pseudocerastes persicus*

ECHIS CARINATA—The Saw-scaled Viper.

The "Kuppur" of Sind. "Phoorsa" of the Bombay Presidency. "Afai" about Delhi. The "Kallu havoo" of Mysore. "Kattu virian" about Madras; and the "Horatta pam," according to Russell, on the Coromandel Coast.

* A few harmless snakes have the snout covered with small scale—sfor instance, the Genus *Eryx*. *Hipistes* too may be included with these. In all these, two or often many more rows of costals are visible from beneath (*see* Fig. 3).

Identification.—The undivided state of the shields beneath the tail will admit of no confusion with others of this group.

Supplementary characters.—*Supraocular* not divided. *Nasal* touches the rostral and the 1st supralabial. *Eye.*—Diameter exceeds its distance to the nostril, and is greater than its distance to the edge of the lip, 2 rows of scales between it and the supralabials. *Supralabials.*—The 4th is the largest of the series (rarely, the 3rd). *Sublinguals* touch 3 or 4 infralabials, and 2 small scales behind. *Infralabials* 4 (rarely 3), the 4th touching 2 scales behind. *Scales* in mid-body 27 to 37. *Ventrals* not ridged laterally. *Subcaudals* undivided. During life its peculiar habit of throwing its body into a double coil inflating itself, and then rubbing one coil against the other so as to produce a sound closely resembling hissing, will in itself proclaim its identity.

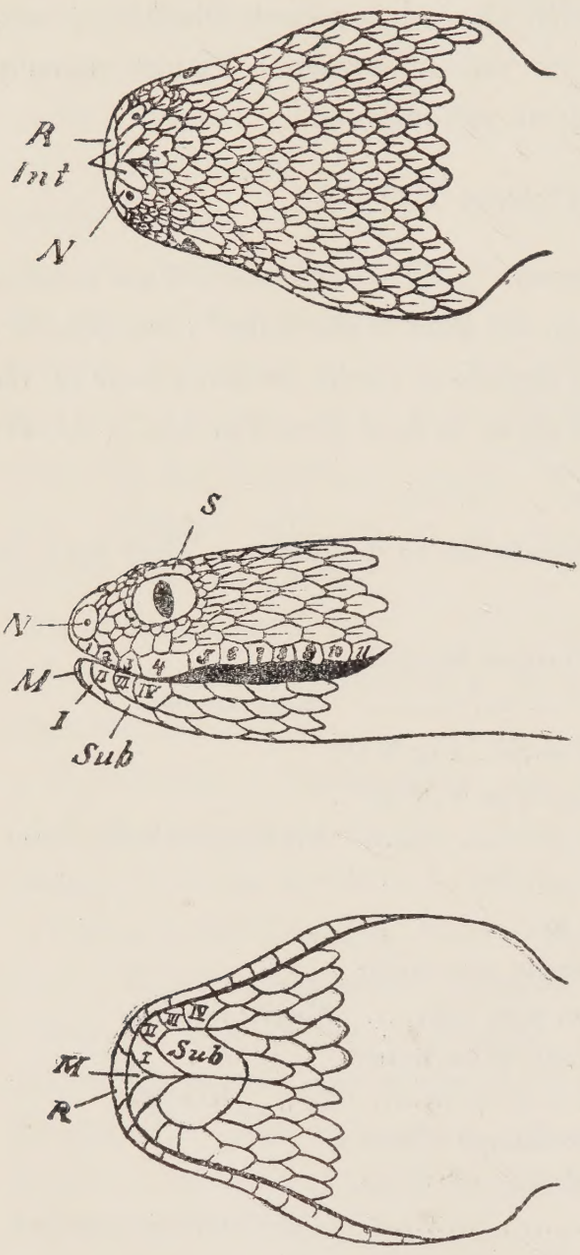

FIG. 37.—Echis carinata (× 2½).

Distribution.—It occurs in the North-East of Ceylon and throughout a large area of the Indian Peninsula from Cape Comorin to the Ganges, but being a desert form preferring an arid sandy soil, it is distributed chiefly in isolated patches where it is frequently very common. Jerdon remarks it is common throughout the Carnatic. I have found it especially so about Trichinopoly. I believe it does not occur in the narrow tract between the Hills and the Malabar Coast, South of Goa. To the North-East its limits are not exactly known; if it occurs in Bengal it is scarce and only to the South of the Ganges. To the North-West it extends through Rajpootana, the Punjab, Sind and Baluchistan to Transcaucasia and is extremely abundant in these parts. Some idea of

its prodigious numbers was furnished by Vidal.* He says that in the Ratnagiri District (Kanara) alone during 6 years Government rewards were paid on an average of 225,721 phoorsas per annum! Later he remarks that when the Government reward was raised tentatively from six pies to two annas per head, 115,921 were paid for in 8 days (December 2nd to 10th, 1862). Again Candy in the same Journal (page 85) says that in Ratnagiri, in August and September, the Mhars go out with long sticks to which forks are attached and catch them in thousands for Government rewards. It is an inhabitant of the plains, and becomes progressively scarcer at altitudes ranging up to 5,000 feet. 5,700 feet is the highest I know of. Nicholson shows† that of 1,225 poisonous snakes collected in the vicinity of Bangalore (circa 3,000 feet) upon which Government rewards were paid in the year 1873, only one proved to be an *Echis*.

Poison.—Very conflicting opinions have been expressed regarding the virulence of *Echis* poison. It is asserted by many that death is an extremely rare sequel to its bite, but I think there can be no doubt that fatalities are much more frequent than many suppose. Vidal, whose paper in the Bombay Natural History Journal‡ is a most valuable contribution to the literature on this species, states that he found records of 62 fatal cases treated in the Civil Hospital at Ratnagiri in the year 1878. He estimated that about 20 per cent. of the cases of *Echis* bite proved fatal, and remarks that the poison is slow, death occurring on an average in 4½ days, but that some cases lingered on for 20 days. He says later that the *Echis* is a far more potent factor than any other venomous species in swelling the mortality of the Bombay Presidency. He substantiates this assertion by the very significant observation that in *Echis*-ridden tracts the mortality from snake-bite far exceeds that in districts where this snake is comparatively scarce. In a table compiled from official returns for 8 years (1878 to 1885), for the districts of the Bombay Presidency, he shows that in the districts of Hyderabad, Thar and Parkar, Karachi (Sind) and Ratnagiri (Kanara), where the *Echis* abounds, one man in 5,000 dies per annum from snake-bite, whereas in the districts of Bijapur, Nasik, Ahmednagar and Sholapur, where this snake is rare or absent, only one man in 100,000 dies from snake-bite. Murray§ says "this little viper is

* Journal, Bombay Natural History Soc., Vol. V., p. 64.

† "Indian Snakes," p. 173.

‡ Vol. V., p. 64.

§ "*Reptilia* of Sind," p. 57.

very venomous; although the action of its poison is not quite so quick as that of a cobra, it is equally as potent, and numerous deaths annually occur from its bite." Dr. Inlach, Civil Surgeon at Shikarpur* (Sind), says," A reference to police returns will show that in by far the greatest majority of cases serious injury and death have been caused by the bite of this species." Again he avers " the Kuppur is without exception the most deadly poisonous snake in Sind." Mr. Millard has informed me by letter of the case of an attendant in the Bombay Natural History Society's Rooms who, in October 1903, was bitten by an *Echis* in the temple. He was taken off at once to hospital, admitted that he felt no fear, but in spite of prompt treatment died 24 hours afterwards.

In Delhi, in 1897, I knew, and many times saw, a famous snake-catcher called Kallan bring his week's bag to the Civil Hospital where he extracted the poison of cobras, kraits and "afais" for the Civil Surgeon (Major Dennys, I.M.S.) who sent it on to the Government of India. The poison collected, he conveyed his specimens to the Deputy Commissioner for the Government rewards. Each head had to be chopped off, and when later he was counting these out for the satisfaction of an official before payment, one *Echis* head fastened itself on to his finger. The dose of poison under the circumstances must have been very small, nevertheless most alarming symptoms rapidly supervened, and Major Dennys told me that when he visited the man that night he expected he would die, so grave was his condition. He, however, recovered. One must not allow oneself to be misguided by the many records in which dogs and other small animals have not succumbed to the bite of this snake, and infer that man would probably be even less effected. One can find numerous instances of small animals not succumbing to the effects of bites of cobras and Russell's vipers, though we know how fatal these poisons usually are.

Dimensions.—Grows to about 2 feet.

Colour.—Various shades from sandy to dark cedar. A more or less distinct pale sinuous flank line always present. A pale mark on the crown somewhat resembling the imprint of a bird's foot. Belly uniform whitish, or dotted with light brown or dark spots.

ERISTOCOPHIS MCMAHONI—McMahon's Viper.

Identification.—The ventral shields are ridged on either side unlike other species of this group, and this is the best means of diagnosis (*see* fig. 37 C.).

* Trans. of the Bomb. Med. and Phys. Soc., Vol. III., p. 80.

Supplementary characters.—*Supraocular* absent, replaced by small

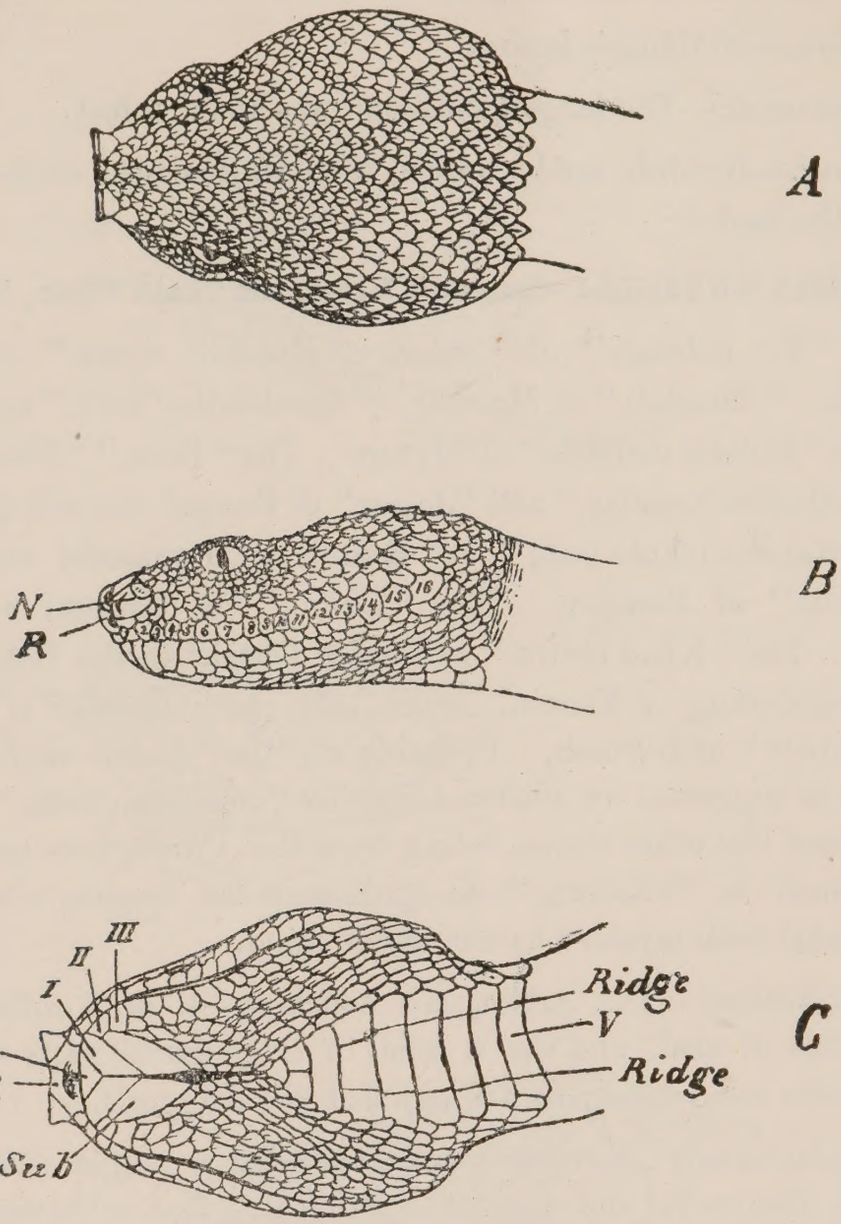

FIG. 38.—Eristocophis mcmahoni (nat. size).

scales. *Nasal* does not touch the rostral, nor the 1st supralabial. *Eye.*—Diameter less than the distance between eye and nostril ; about half the distance to the labial margin ; 5 or 6 rows of small scales between it and supralabials. 4th *supralabial* not enlarged. *Sublinguals* touch 3 infralabials, and 3 small scales behind. *Infralabials* 3, the 3rd touching 3 scales behind. *Scales* in the middle of the body 23 to 27. *Ventrals* ridged laterally. *Subcaudals* divided.

Distribution.—Very little is known on this point. Baluchistan, where it was discovered by Captain McMahon * when delimiting the Afghan Baluch border, is probably the fringe of its distribution, and

* Now Sir A. H. McMahon.

it is probably only to be found at this corner of our Indian possessions. It is a desert form inhabiting sandy tracts.

Poison.—Nothing is known.

Dimensions.—The largest specimen was about 2 feet.

Colour.—Reddish sandy brown, with white edged dark-brown spots along the back.

VIPERA RUSSELLI—Russell's Viper, the Chain Viper, the Daboia.

The "Tic polonga" of Ceylon. "Kanardi virian" of Tamils in Madras. "Mandali" of Malabar. "Mandalatha havu," and according to Rice "Kolaku mandala" of Mysore. The "Bora," "Chundra bora," "Siah chunder amaitar," and "Jessur" of Bengal according to Fayrer. The "Katuka rekula poda" of Russell (Coromandel coast?). The "Gunnus" of Bombay. The "Chitar" of Guzerat according to Mosse. The "Khad chitra" of Dantra District in the Bombay Presidency according to Fenton. I am told the "Korail" of Sind. The "Mwe-bwe" of Burmah. Probably also the "Cobra monil" of some natives as suggested by Jerdon; literally "necklace snake" in Portuguese, and like other names dating from the Portuguese occupation of India, such as "biscobra," its significance has become obscured, and surrounded with mystery by the native mind.

Identification.—The sublinguals touching 4 or 5 infralabials, the subcaudals divided, and the 3 series of large dorsal spots when occurring in the same specimen will establish the diagnosis.

Supplementary characters.—*Supraocular* a single shield. *Nasal* touches the rostral and the 1st supralabial. *Eye.*—Diameter exceeds distance of eye to nostril, and is subequal to its distance to the labial margin in the adult; 2 or 3 rows of scales between it and the labial margin. 4th *supralabial* the largest of the series. *Sublinguals* touch 4 or 5 infralabials and 2 scales behind. *Infralabials* 5 large normally, the 5th touching 2 scales behind. *Scales* in midbody 27 to 33. *Ventrals* not ridged laterally. *Subcaudals* divided.

Distribution.—Ceylon. Peninsula India from Cape Comorin to the Ganges. It is I believe not found to the North of this River,* and though common in the Irrawady Basin is not known from the Brahmaputra Basin. To the West it extends throughout the Indus Basin from North Sind to the Himalayas. It is chiefly an inhabitant of

* I am aware of the record by Sclater of Purneah, but this solitary record I think calls for confirmation.

the plains, but is common in some localities from 2,000 to 4,000 feet and has been met with at altitudes up to 6,000 and 7,000 feet.* In most

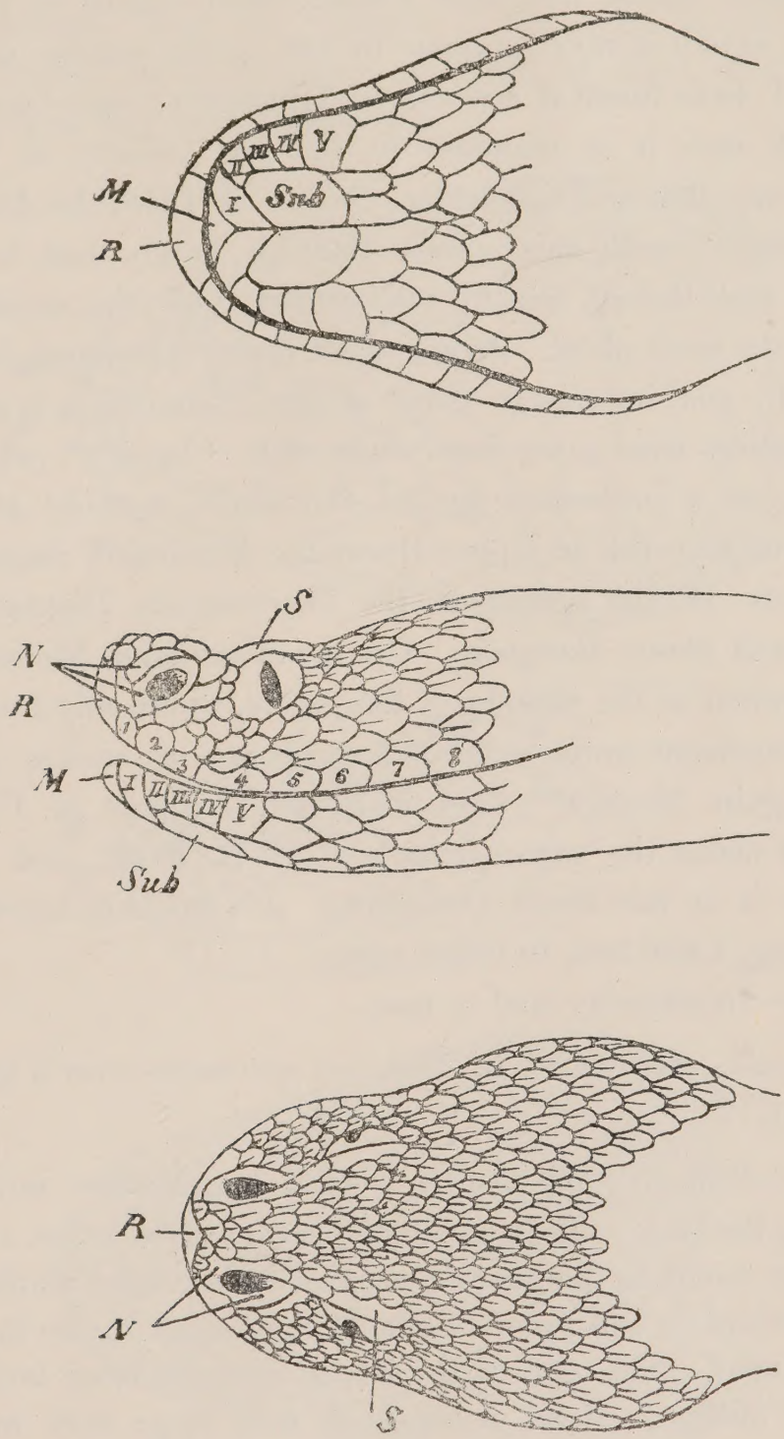

FIG. 39.—Vipera russelli (nat. size).

parts it is quite a common snake, but is especially so in certain localities. Fayrer† says it is very common in the Punjab and that at Umritsar in 1866 as many as 471 specimens were brought in for Government rewards in one day! Mr. Millard tells me it is common

* Kashmir 6,000 ft. (Stoliczka). Nilgiris 6,000 ft. (Henderson, private letter). Pulneys 6,300 ft. (Revd. Father Gombert, private letter). Pulneys 7,000 ft. (Henderson, private letter). Hakgalla, Ceylon, 5,700 ft. (I have received specimens from Mr. Nock).

† "*Thanatophidia*," p. 55.

near Bombay. Mr. Henderson in a private letter says it is fairly common at Kodai Kanal in the Pulneys. Father Gombert, S.J., in a private letter makes the same remark with regard to the Pulneys. Stoliczka* says it is very common in the south portion of the Kulu Valley. I have found it common at Trichinopoly and Cannanore, and Ferguson† says it is common in the low country at Travancore. Tennent‡ says that at Trincomalee, Ceylon, in 1858, the Judge's house was so infested with this species that his family had to quit their quarters, and Bassett Smith§ also remarks on the number of this species in the same place. Evans and I found it common in most parts of Burmah, and in certain parts of that Province it is so numerous that the natives wear grass shoes made with "uppers" when busy in the crops as a protection against this snake, notably at Mahlaing, Magwe, and Myo-thit in Upper Burmah. Theobald¶ remarks on the commonness of the species in the Tharrawaddy District in Lower Burmah, and above Rangoon. On the other hand, Nicholson‖ shows it is uncommon in the vicinity of Bangalore, where only 2 were brought in for Government rewards out of 1,225 poisonous snakes in the year 1873. Again Murray** says it is not common in Upper Sind. Blanford†† makes the same remark of S.-E. Berar, and Mr. Miller writes me it is rare about Darjeeling. He has only known one, *viz.*, at Kurseong, 4,600 feet, in many years.

Poison.—Indubitably fatal to man.

Dimensions.—Grows to 5½ feet, but specimens over 5 feet are very exceptional.

Colour.—Buff, or light brown with 3 longitudinal series of large spots along the back. These usually consist of three zones, a central one of the same colour as the ground, a narrow dark zone, skirted by a still narrower white or buff zone. Some of these spots in the median series often confluent. The spots in the lateral rows are often broken at their lowermost outline. Head ornamented with large dark marks, and a conspicuous pink or salmon V with its apex on the snout. Belly whitish with dark semilunar scattered spots.

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* Jourl., Asiatic Soc. of Bengal, Vol. XXXIX., p. 226.
† Jourl., Bomb. Nat. Hist. Soc., Vol. X., p. 8.
‡ Nat. Hist. of Ceylon, p. 296.
§ Jourl., Bomb. Nat. Hist. Soc., Vol. XI., p. 546.
¶ Cat. Rept., Brit. Burm., p. 64.
‖ Ind. Snakes, p. 173.
** The Rept. of Sind, p. 56.
†† Jourl., Asiatic Soc. of Bengal, Vol. XXXIX., p. 374.

VIPERA LEBETINA—The Levantine Viper.

Identification.—The sublinguals touching 4 or 5 infralabials; the subcaudals divided; and the absence of the large lateral spots on the sides so typical of the last when occurring together, will suffice to identify this from the rest of the group.

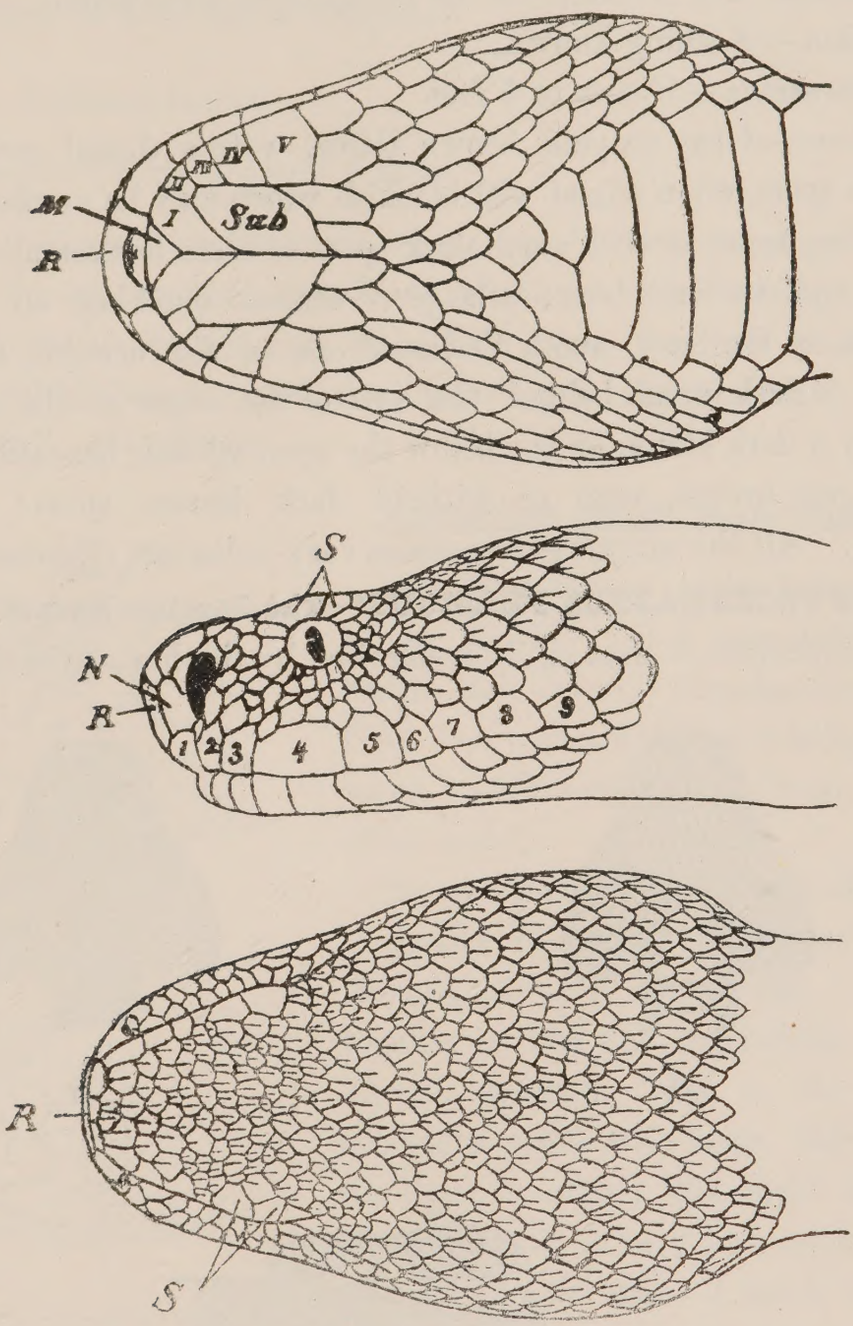


FIG. 40.—Vipera lebetina (nat. size).

Supplementary characters.—*Supraocular* well developed or broken up into small shields. *Nasal* touches the rostral and the 1st supralabial. *Eye.*—Diameter about equals its distance to the nostril, about half its distance from the labial margin; 2 or 3 rows of scales between it and the supralabials. *4th supralabial* the largest of the series.

Sublinguals touch 4 or 5 infralabials and 2 scales behind. *Infralabials.*—5 large normally, the 5th touching 2 scales behind. *Scales* in middle of body 23 to 27. *Ventrals* not ridged laterally. *Subcaudals* divided.

Distribution.—An inhabitant of Northern Africa and South-Eastern Europe, it extends through Asia Minor eastwards so as to include Baluchistan and Kashmir on the fringe of its distribution.

Poison.—Nothing known.

Dimensions.—Grows to 5 feet.

Colour.—Grey or pale brown above, with a dorsal series of large brown spots, often edged with blackish which may be confluent into an undulous band, or with small dark spots or cross-bars, small dark lateral spots, and vertical bars; a large V-shaped marking on the upper surface of the head, and a V-shaped one on the occiput, may be present; a dark streak behind the eye to the angle of the mouth; and usually a dark blotch or bar below the eye; whitish beneath, powdered with grey-brown, with or without dark brown spots; end of tail yellow. All the markings sometimes very indistinct (Boulenger).

PSEUDOCERASTES PERSICUS*—The Persian Horned Viper.

Identification.—Most easily recognised by the horn over the eye.

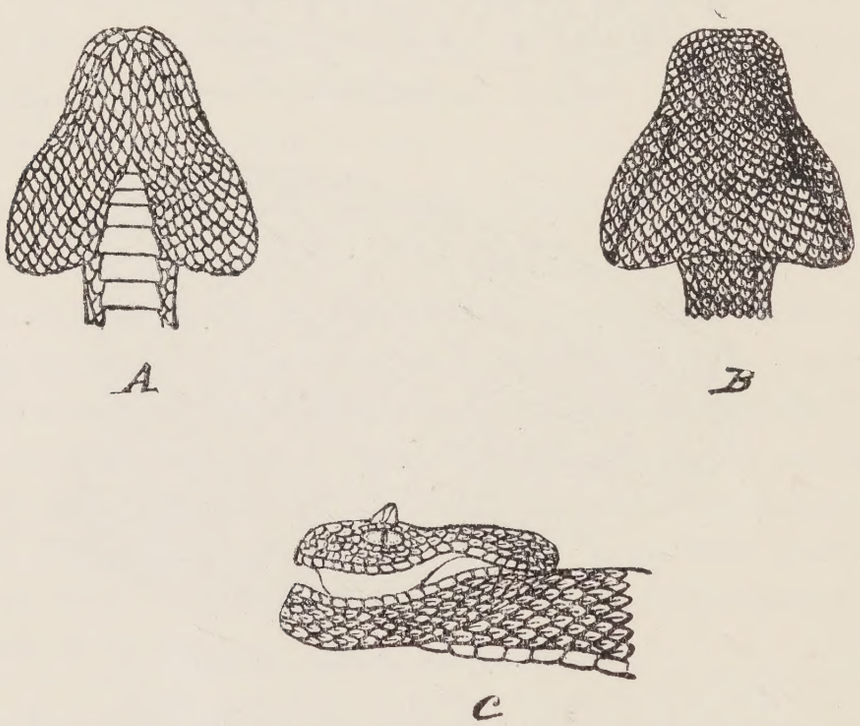


FIG. 41.—Pseudocerastes persicus (nat. size), from a specimen in the Indian Museum. The profile view may not show the detail of the scales accurately as the specimen is damaged.

* This snake, previously only known from Persia, has been recorded by Dr. Annandale from Koh Malik, Sujah, Baluchistan (Journl., Asiat. Soc., Bengal, Vol. LXXIII, p. 211) and thus occurs within our British Indian limits.

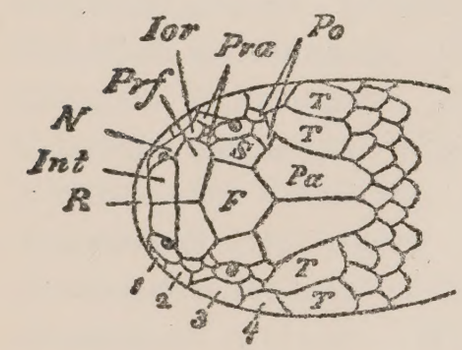
Supplementary characters.—*Supraoculars* many, small scales. A horn-like appendage at the back of the Eyebrow (not shown correctly in figure). *Nasal* not touching the rostral nor 1st labial. *Sublinguals* touch 4 infralabials. *Infralabials* 4. *Scales* in midbody 23 to 25. *Ventrals* not ridged. *Subcaudals* divided.

Distribution.—Persia and Baluchistan.

Poison.—Nothing known.

Dimensions.—Grows to about 3 feet.

Colour.—"Greyish or brownish above, with four series of large dark spots, the two median sometimes confluent and forming cross-bars; a dark streak on each side of the head from the eye to behind the gape; whitish beneath, dotted with dark, and with a lateral series of dark spots." (Boulenger.)



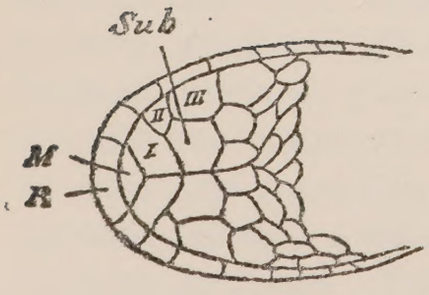


FIG. 42.—Azemiops feæ (after Boulenger).

AZEMIOPS FEÆ—Fea's Viper.

Identification.—(1) scales in midbody 17 (*see* fig. 7). (2) 6 supralabials of which the 3rd only touches the eye. These two points when co-existing will serve to differentiate this from every other snake.

Supplementary characters.—*Frontal* unusually broad, about 3 times the breadth of each supraocular. *Nasal* touches 1st and 2nd infralabials only. *Loreal* present. This is the only poisonous snake with large shields on the head in which this shield occurs. *Præoculars* 3. A very unusual feature. (Except the pit-vipers I know of only one other snake where these shields are 3, *viz.*, *Lytorhynchus paradoxus*). *Temporals* 2. The upper touching one supralabial only, *viz.*, the 4th. Eye with vertical pupil. *Supralabials* 6, the 3rd only touching the eye. *Sublinguals.*—One pair only each in contact with 2 scales behind. *Infralabials* 3 only.

Distribution.—One specimen only known discovered by Mons. Fea in the Kachin Hills of Upper Burmah.

Poison.—Nothing known.

Dimensions.—2 feet.

Colour.—Boulenger* says: "Lower parts olive-grey with some small lighter spots; chin and throat variegated with yellow." He further remarks it is strikingly like a harmless colubrine in external appearance.

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* Fauna of Brit. Ind., *Reptilia* and *Batrachia*, p. 419.

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